

No. 186. Vol. XXXIX. Part 4.

NOVEMBER, 1954.

GEOGRAPHY

FORMERLY THE GEOGRAPHICAL TEACHER.



THE QUARTERLY JOURNAL OF THE GEOGRAPHICAL ASSOCIATION

Central Office :
c/o The Park Branch Library,
Duke Street, Sheffield, 2.
(Telephone : 25946.)

LONDON :

PUBLISHED FOR THE GEOGRAPHICAL ASSOCIATION BY THE LONDON GEOGRAPHICAL INSTITUTE
MESSRS. G. PHILIP AND SON, LTD., 32, FLEET STREET, E.C.4. AND PRINTED BY
PERCY BROTHERS, LTD., THE HOTSPUR PRESS, MANCHESTER ; AND AT LONDON.
PUBLISHED FOUR TIMES A YEAR.

PRICE TO NON-MEMBERS, 5s. NET.

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THE PHYSIQUE OF THE SOUTH WEST†

S. W. WOOLDRIDGE*

IN many signal respects the South Western Peninsula stands out among the physical regions of Britain as highly distinctive, if not unique, in its form and evolution. Here is a country of "upland plains," of level sky-lines and slopes gentle and regular, save along the margins of the deeply incised river-trenches. Yet, as is well known, the land-forms are the long-term successors of a major mountain system. Late Palaeozoic times saw the crumpling and over-thrusting of some 10-15,000 feet of Devonian and Carboniferous sediments and the building of an important section of the great Hercynian or Armorican mountain system. The mountain structures are still laid bare in cliff section and valley-side quarries, but the original mountainous relief has long since been obliterated by erosion. The essential "grain" of the country still shows itself locally in low ridges, or in valleys following fault-lines or other zones of weakness, but the older stages of the physical history of the area throw very little light on its present form. The axis of the peninsula as a whole is oblique to the structural grain, while in detail it plainly presents the results of a long and complex history of river-dissection, punctuated by phases of planation. It is these later chapters of the physical history which fall to the geomorphologist to elucidate and the aim of the present paper is to give an account of the methods and arguments used by workers in this field and an indication of the conclusions to which such work points.

The Drainage Pattern

Let us make a direct approach to the problems at issue by studying the drainage system in relation to the form of the peninsula as a whole (Figs. 1 and 2).

The main water-parting begins on the cliff-top near Land's End and climbs thence *via* Carn Brea to the chain of high granite summits which lie little more than a mile from the northern coast. It traverses four summits at 700 ft., four at 750 ft. and one at 800 ft. before climbing again to 800 ft. at Trendrine Hill near St. Ives. Here the line bends sharply south-eastwards, descending from the granite and crossing the depression which spans the peninsula between Hayle and Marazion. Its lowest point (about 90 ft. O.D.) is at the col south of St. Erth. Beyond it traverses Perran and Keneggy Downs at 250-300 ft. *en route* to Tregonning Hill. This is the only stretch of the line throughout the peninsula which lies close to the southern coast.

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† A lecture delivered to the Spring Conference of the Association at Exeter on Wednesday, 21st April, 1954.

From the southern end of Tregonning Hill the line pursues a fairly straight course for some 35 miles to near Bodmin remaining parallel with the axis of the peninsula and not far from its median line, though nearer the northern coast. It first crosses the broad flat-floored col at Nancegollan (300 ft.) and then climbs to traverse the northern side of the Carnmenellis Granite mass, via Hangman's Barrow to Carn Marth; the summits in this stretch range between



Fig. 1.—The original drainage system of the South West.

700 and 750 ft. Beyond, where the line closely follows that of the main Bodmin road, the summit elevations are part of a lower plateau level at 350–500 ft. It rises suddenly to 695 ft. east of St. Enoder where it passes on to the St. Austell Granite but it quickly leaves this to traverse the outlying twin-summits of Castle an Dinas and Belowda Beacon, both at 700 ft. East of the latter the higher culminating points of the water parting are widely spaced and range in height from 550–650 ft. South of Bodmin the line is notched by a col at 400 ft. before beginning its northward climb to the high ground of Bodmin Moor. It ascends over Racecourse Downs following the line of the Launceston road and traversing two summits at 700 ft., two at 800 ft. and one at 850 ft. before reaching 1,000 ft. at Hawks Tor. Northwards five successive summits are at 950 or 1,000 ft., but there is a further sudden rise on to "High Bodmin" at Tolborough Tor (1,100 ft.) and Brown Willy (1,350 ft.). North of the latter the line descends on to the remarkable flat of Davidstow Moor, where it just exceeds 1,000 ft. in elevation three times in five miles. There follows a sudden descent to 800 ft.

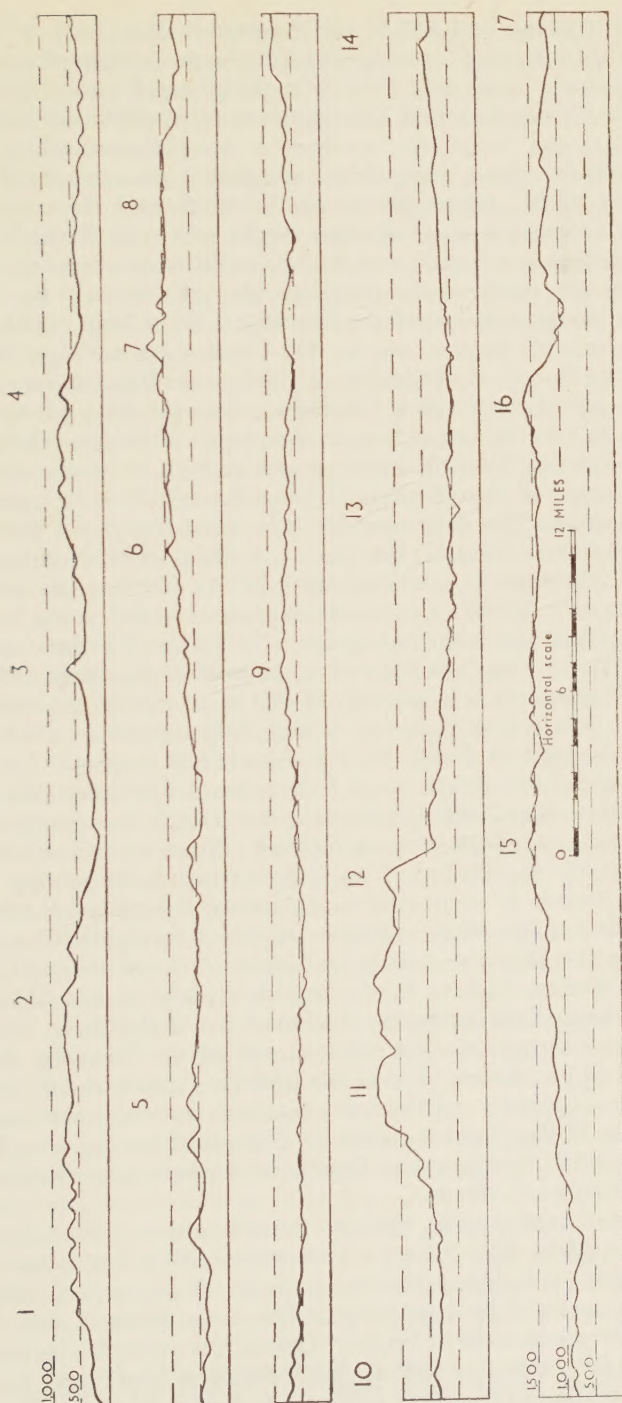


Fig. 2.—The profile of the present peninsular divide.

1. Carn Brea. 2. Trendrine Hill. 3. Tregonning Hill. 4. Carn Marth. 5. Belowda Beacon. 6. Hawks Tor. 7. Brown Willy. 8. Davidstow Moor. 9. Nr. Woolley. 10. S. of Ashbury Station. 11. Hilly Tor. 12. Cawsand Beacon. 13. Copplostone. 14. Nr. Stoodleigh Beacon. 15. Five Barrows. 16. Nr. Dunkery Beacon. 17. Nr. Heydon Hill.

west of Otterham, and 850 ft. on Tresparrett Moor. Here for the first time since leaving Trendrine Hill the water-parting returns close to the northern coast. It then falls fairly rapidly to 580 ft. near Jacobstow; from here to Kilkhampton it is parallel with and close to the coast and manifestly traverses a low plateau surface. In a distance of some eleven miles there are eighteen low summits of which four are at 550 ft., ten at 500 ft., one at 450 ft. and three at 400 ft. North of Kilkhampton a slow climb begins and near Woolley at the head of the Tamar valley the line reaches 700 ft. before turning sharply south-eastward, transverse to the peninsular axis between the Tamar basin and the headstream of the Torridge. For a long distance the prevalent summit heights are at 600–650 ft. but south of Halwill junction, the line climbs suddenly to 800 ft. near Hender Barrow and the higher points are at 800–900 ft. for a further ten miles till a further sharp rise to 1,200 ft. takes place on the margin of the Dartmoor granite. Here the line describes a short loop over High Dartmoor *via* Kitty Tor, Cranmere Pool, Hangingstone Hill and Cawsand Beacon, separating the Okement and Taw drainage from that of the Tavy and the Dart.

East of Cawsand Beacon the line leaves the granite, dropping very steeply in less than two miles from 1,750 to 900 ft. Beyond is a slower descent to 550 ft.; two cols at 400 ft. are crossed on the Permian rocks near Bow and after rising again to 550 ft. the line descends below 350 ft. at Copplestone in the col linking the Yeo and Taw valleys. Northwards a height of 550–600 ft. is quickly resumed and a long slow climb then begins up a singularly smooth and unbroken slope to a summit at 950 ft. west of Stoodleigh Beacon. The crest retains levels of 800–900 ft. for a further four miles before dropping to 700 ft. at Anstey Station in crossing the long furrow which marks the southern edge of the Exmoor upland. Northwards the 900-foot level is quickly regained, but on Exmoor the water-parting loops sharply westwards so as to enclose the eastward-flowing headstreams of the Barle and the Exe. It rises steadily from 1,000 ft. north of Anstey via the ridge of Anstey and Molland Commons, and turns northward thence close to the county boundary to Wood Barrow (1,550 ft.) above Pinkworthy Pond at the head of the Barle, where it turns back eastwards via the western end of the Dunkery Beacon ridge (1,650 ft.) to the crest line of the Brendon Hills at about 1,300 ft. Here it turns sharply southwards between the southward-flowing headstreams of the Bathern and the Tone, maintaining crest levels at about 1,100 ft. southward to Heydon Hill where a further drop to a level of 900–950 ft. occurs.

The main water-parting we have traced is some 250 miles long and if it could be followed by a "Cornubian Way" it would offer the geographer a highly instructive journey. It is, in fact, followed throughout most of its length by roads, some modern, but many undoubtedly pre-historic in origin. Despite its variable elevation it marks, in each successive section, the "height of land" and barrows and other evidence of ancient occupancy abound along it. For our

present enquiry, however, its prime interest is the light it throws upon the contest between northward and southward flowing drainage. Every col on the line offers us a possible instance of river piracy and the briefest scrutiny indicates many such adjustments. Three of these are of major importance.

In the far west it is clear that an original southward drainage has been reversed in the Hayle-Marazion depression. To-day the direct headstream of the River Hayle rises at Germoe, little more than a mile from the southern coast, but the main headstream flowing south-west from near Crowan, and the tributaries which join the Hayle south of St. Erth have directions accordant with a former southerly flow through the depression.

The peculiar looped course of the Camel indicates reversal on even larger scale. The Camel headstream and its neighbour the Allen flow south-westwards from a secondary water-parting close to the northern coast. The trunk stream above Wadebridge makes an angle of about 280° with their direction and its relation to them and to its main left bank tributaries suggest that the original drainage was southwards. At Red Moor a broad gap, with floor at about 450 ft., indicates the probable course of the old drainage line to the neighbourhood of Lostwithiel and the present Fowey estuary.

The circumstances of this reversal of drainage are suggestively indicated by those of the evidently imminent capture of the headstream of the Tamar by the Bude Haven drainage. The main stream of the Bude embayment trends N.N.W. Its southward-flowing right-hand tributary, the River Strat, is related to it almost exactly as the Allen is related to the lower Camel. But the steep descent of the streams draining to the coast here must inevitably lead to an eastward migration of the main divide and the beheading of the Tamar; the most likely place for the diversion would seem to be the col at 350 ft. near Whitstone and Bridgerule Station.

This clear case of impending capture which, when achieved, will closely imitate the great Camel loop, throws a similar light on the remarkable course of the Torridge. From its source near Hartland for twelve or more miles the river follows a south-easterly course essentially parallel with that of the Tamar. The high ground of Dartmoor lies athwart the continuation of the line and it is evidently probable that the original flow was eastwards to the Exe drainage. The lower Torridge from near Hatherleigh to Bideford Bay is either of altogether more recent origin or the reversed descendant of a parallel stream formerly flowing south-east. The line of the Taw continued in that of the Yeo may similarly mark the line of a former stream flowing south-eastwards to join an ancestor of the Creedy; the conspicuous upstream junction with the Taw of its tributary the Bray flowing southwards from Exmoor evidently supports this interpretation¹.

¹ This reversal of the drainage of N.W. Devon was perceived long ago by A. W. Clayden in his *History of Devonshire Scenery* (1906), though his general picture of the evolution of the drainage cannot now be accepted.

The Exe, like the Tamar, still heads close to the northern coast, its direct headstream the Quarme, continued by the Exe below Exton, taking a singularly straight line a few points east of south, followed with local deviations to the estuary. Eastwards of the Exe a series of captures has broken the continuity of similar southward-flowing streams. The Bathern has beheaded the Loman and the upper Tone has been diverted eastwards by a subsequent tributary of the Parrett, leaving the Spratford stream and the lower Culm marking the beheaded trunk, and the Burlescombe gap as a permanent legacy in the route or transport geography of the South West. This capture is analogous to that of the Bray by the Taw. It has originated by simple adjustment to structure, the ready excavation of the Triassic rocks. Its western analogue may well have originated in the same way before the removal of the Permo-Triassic cover of north-west Devon.

Taking a general view of the rivers as a whole there is thus clear evidence of a former drainage to the south or south-east, of which the Exe and the Tamar remain as substantial witnesses, though other members of the same family have suffered reversal of their head-streams. If we take account of the reversals it is clear that at an early date the peninsular water-parting lay everywhere near, or perhaps even beyond, the present north coast (Fig. 1). We can carry it in imagination from the north-eastern end of the Land's End granite upland across or off-shore of the Camel estuary to the head of the Tamar, beyond which it must have crossed the present site of Bideford Bay to follow a line close to the present northern coast. The drainage system so reconstructed implies an "initial surface" sloping southwards. But there is another element in the drainage pattern which implies an original easterly slope. This is reflected in the rivers of Exmoor and in the main stream of the Dart above Holne Bridge, continued in the line of its former valley east of Ashburton, now abandoned, but directed towards the Teign estuary. The upper Teign is also an eastward-flowing stream; it turns sharply southward near Dunford, but the broad flat-floored col, just below 650 ft. near Longeross suggests that it formerly continued its eastward flow to join the Exe.

The Erosion Surfaces

Our attempt to reconstruct the broad original lines of the drainage system confronts us immediately with the problem of the age and origin of the widely extended smooth-surfaced plateaux of the area. In brief, the question is whether these surfaces were produced by the rivers now entrenched below them, or whether they were, wholly or in part, inherited ready-made by the removal of former covering strata, or by the uplift of one or more plains of marine denudation.

It is evident that the Permo-Triassic series, or "New Red Sandstone" once extended widely beyond its main outcrop over the worn-down surface of the Hercynian mountains. Of such former extension the long Crediton-Hatherleigh tongue of mid-Devon is a clear indica-

tion. Further west, a Permian outlier occurs at Babbacombe on the shores of Bideford Bay; on the south coast such outliers extend to the Plymouth area and off-shore exploration by direct sounding and seismic prospecting has recently proved² a large area of "New Red" rocks on the Channel floor north of the Eddystone reef. It is equally certain that the Cretaceous cover must have exceeded its present limits; if we replace the Chalk in imagination above the summit of the Haldon Hills it is clear that it must have passed onto or above the present higher parts of Dartmoor. Linton³ has recently found reason to suppose that the culminating point, High Willhays (2,046 ft.) may mark approximately the level of the basal plain of the Upper Cretaceous rocks thus projected, and a similar relation may be tentatively inferred in the case of the high Exmoor summits. Between the two upland areas the Cretaceous cover probably rested on Triassic rocks. These considerations indicate that there may well be elements in the present landscape which represent the respective "floors" of the former cover rocks. We should not expect, however, to find such old surfaces in a nearly horizontal attitude, save quite locally. The original base of the Permo-Triassic desert sediments may well have been irregular, but, further, the cover rocks have necessarily suffered later folding and faulting. The Permo-Trias cover is strongly tilted and often faulted at its margins. It survives, for instance, as outliers at 900-950 ft. on both sides of the Exe valley north of Tiverton, but beneath the main outcrop barely two miles away, the Permian base is probably below sea-level. We should at least expect both the New Red and Cretaceous covers to record the effects of the early Tertiary movements which raised the Chalk sea floor into land, and the mid-Tertiary or Alpine movements accountable for the strong folding of South-East England. Folding of this date is believed to extend into eastern Somerset and it is highly probable that contemporary faulting occurred further west. The lacustrine deposits of Bovey Tracey (Upper Oligocene or early Miocene in age) rest in a depression interpreted by Clement Reid⁴ as a rift-valley, bounded by faults trending NW-SE. The similar Petrockstow deposits of northwest Devon also rest in a depression which may well mark the continuation of the same zone of faulting. Faulting of similar trend and probably of the same date is conspicuous throughout the peninsula, notably in Eastern Cornwall.

It appears, then, that the level "upland-plains" of Devon and Cornwall cannot be interpreted, as a whole, simply as "fossil-surfaces" stripped of the later rock-cover. The alternative view relegates these surfaces, as it were, to "mid-air," regarding them as largely consumed

² M. N. Hill and W. B. R. King. "Seismic Prospecting in the English Channel and its geological interpretation," *Quart. Journ. Geol. Soc.*, vol. 109, 1953, pp. 1-19.

³ D. L. Linton. "Problems of Scottish Scenery," *Scot. Geogr. Mag.*, vol. 67, 1951, pp. 65-85.

⁴ W. A. E. Ussher and others. "The Geology of the country around Newton Abbot," (Sheet 339), *Mem. Geol. Survey*, 1913.

by river erosion in Tertiary times. This was essentially the standpoint adopted by W. M. Davis,⁵ who represented the main upland surface of the peninsula as a single peneplain, with certain elements, such as the Dartmoor granite and the more resistant members of the Exmoor sequence, rising above it as monadnocks. This view is readily consistent with the widely accepted conclusion that the higher summits of South East England between 700–1,000 ft. represent a peneplain of Miocene date. It is reasonable to infer that the long period of erosion there represented must have run its course also in South West England and left a legible mark upon the landscape, such as we might seek to identify with one or more of the high plateau surfaces.

The general course of later investigation proves, however, unfavourable to this interpretation, finding evidence which is held to indicate successive episodes of marine planation. The coastal "400-foot platform" in Cornwall, with a clearly marked but degraded cliff-feature behind it, has long been known and was early regarded as of Pliocene date by Clement Reid by reason of its association with the fossiliferous St. Erth Beds. Later Barrow⁶ recognised the remarkable high-level platforms of the Bodmin area at approximately 750 and 1,000 ft. and by analogy with the 400-foot feature he concluded that these, too, were old "strand-flats." Whatever their origin such platforms have necessarily been modified, and locally completely destroyed, by later river dissection. This has obviously been at a minimum along the main peninsular water-parting, and our brief description above suffices to show that the surviving summits fall into distinct groups suggestive of a succession of platforms. A statistical study by Hollingworth⁷ of the frequency of occurrence of summit heights throughout the peninsula fully establishes and extends this conclusion. He confirms the presence of the surfaces earlier recognised at about 400 and 1,000 ft. and finds strong indications of others at 520–540 ft. and 620–640 ft. Between 740–940 ft. two distinct platforms are in evidence and there are indications of a surface at about 1,150 ft. above the 1,000 ft. platform.

Further confirmation comes from two field studies by J. F. N. Green in East Devon⁸ and W. G. V. Balchin⁹ on Exmoor. Both these workers have mapped the surviving portions of a series of platforms and the bluffs which mark their upper limits, regarded as degraded coastline features. Their results are significantly accordant though they differ in the number of platforms distinguished. In East Devon, Green recognises a limited area of a 1,000-foot platform on the summit

⁵ W. M. Davis. "Glacial Erosion in North Wales," *Quart. Journ. Geol. Soc.*, vol. 65, 1909, p. 291.

⁶ G. Barrow. "The High Level Platforms of Bodmin Moor," *Quart. Journ. Geol. Soc.*, vol. 64, 1908, pp. 384–400.

⁷ S. E. Hollingworth. "The Recognition and Correlation of High level Erosion Surfaces in Britain," *Quart. Journ. Geol. Soc.*, vol. 94, 1938, pp. 55–84.

⁸ J. F. N. Green. "The High Platforms of East Devon," *Proc. Geol. Assoc.*, vol. 52, 1941, pp. 36–52.

⁹ W. G. V. Balchin. "The Erosion Surfaces of Exmoor and Adjacent Areas," *Geogr. Journ.*, vol. 118, 1952, pp. 453–476.

of the Blackdown Hills, succeeded in order southwards by a series of platforms of which the ranges of height, from the base of the upper boundary bluff to the forward edge, are as follows: 920–750 ft., 690–620 ft., 595–545 ft., 530–520 ft., 505–460 ft. In similar terms, Balchin's sequence of platform is as follows: 1,225–1,000 ft., 925–800 ft., 825–750 ft., 675–500 ft. Both authors find local evidence of the 400-foot platform and Balchin recognises a lower surface at about 200 ft.

The problems of the origin and correlation of such platforms have occasioned much discussion¹⁰ which we cannot here pursue. The conclusion most naturally emerging from the evidence is evident enough. Since the elevation and spacing of the platforms is significantly accordant over long distances, the movements indicated are uniform or "eustatic" downward movements of sea-level, rather than successive uplifts of the land which can hardly have been unaccompanied by some element of warping. With the wider implications of the theory we are not here concerned. It is certainly entitled to rank as a working hypothesis. The South West peninsula is one of the regions which afford cogent evidence for the hypothesis and in which its acceptance or rejection greatly affects our view of general physiographic evolution, and especially of drainage development.

The Relation of the Drainage to the Erosion Surfaces (Fig. 1)

Let us therefore summarise, so far as present knowledge permits, the light thrown by the drainage pattern on the age and origin of the erosion surfaces. The problem involved may best be seen if we consider, in turn, the western, central, and eastern sections of the peninsula. The first includes Cornwall and those parts of Devonshire falling within the Tamar and Tavy basins. Here, if we discount the later northward diversion of parts of the drainage we have a simple pattern implying an initial tilt towards the south or southeast. The most probable date for this movement is mid-Tertiary (Alpine) and it is likely to have been accompanied by faulting. The form of the Tamar basin suggests that it may well mark a former tectonic depression extending across the peninsula, its original margins defined by warping, faulting or both. If we assume that the course of sub-aerial development, following this movement, was unbroken by any major marine incursion, we can identify the 1,000 ft. platform with a peneplain marking the conclusion of a first cycle of erosion. If, on the other hand, this platform and its successors between 920–750 ft. are regarded as marine we should be led to infer that the drainage resumed or at least imitated its former lines as the sea retreated. The relics of these higher platforms within and west of the Tamar basin are limited in extent: the 920 ft. bluff is known in the Bodmin Moor area but its course as a whole is not yet clear. It is impossible, indeed, on present evidence to reconstruct the position of the supposed marine

¹⁰ S. W. Wooldridge. "The Upland Plains of Britain: their origin and geographical significance," *Advancement of Science*, vol. 7. 1950, pp. 162–175.

platforms which may well have been cut partly in Trias and since completely destroyed. Mr. W. D. Mackenzie of the University of Sydney is at present engaged on a detailed study of the area and his results will be awaited with interest. At first sight at least the pattern of the drainage on both flanks of the Tamar basin hardly suggests that it has been extended, stage by stage, across a series of emergent marine platforms with the streams "normal," as they would be expected to be, to the line of the supposed coastlines.

No such difficulty is encountered in the case of the lower platforms. Throughout Cornwall the drainage pattern is closely consistent with "normal" extension across the 400 ft. platform. Before the emergence the Land's End and Carnmenellis granite masses must have been islands, and the western end of the St. Austell mass was the "Land's End" of the period. Although it has not yet been traced in detail there is also good evidence of a platform between 700 and 550 ft. throughout southern Cornwall and the drainage pattern is normally adjusted to it.

Coming now to the central section of the peninsula between the eastern limit of the Tamar basin and the line of the Exe, we are confronted with very different conditions. The drainage pattern shows a relatively strong development of east-west lines and though some of these mark the picking out of the structural grain of the country by subsequent streams, there are significant evidences of the survival of an older drainage system flowing eastwards. This was early perceived by A. W. Clayden and A. J. Jukes-Browne, while in his last paper J. F. N. Green¹¹ extended and modified their hypothesis. It is possible to regard the eastward-flowing streams of Exmoor, central Devon and Dartmoor as relics of an early Tertiary drainage system flowing originally on the Chalk, tilted eastwards towards the Eocene sea in Dorset. A later southerly tilt, no doubt contemporary with that of Cornwall, is also in evidence but this would not be expected to displace the eastward-flowing rivers, by then entrenched in the Palaeozoic undermass. It is clear, in fact, that it did not do so in the Dartmoor and Exmoor regions, though Green has ingeniously argued that it was responsible for the suppression of the northward-flowing tributaries of the Dart on Dartmoor. The drainage pattern of central Devon is more complicated and difficult to interpret, but following Green's line of thought we might sustain the hypothesis that the three main groups of southward-flowing streams, on the flanks of Exmoor, parts of Dartmoor, and in the southern coastal zone were strengthened by the southerly tilt, but initiated as left bank tributaries of eastward-flowing trunks. This might be taken to imply that there was no major marine incursion in the area, except that of the 400-foot sea in the south.

At the line of the Exe, however, we enter country where the dominant drainage direction is again southerly, and eastward-flowing

¹¹ J. F. N. Green. "The History of the River Dart," *Proc. Geol. Assoc.*, vol. 60, 1949, pp. 105-124.

elements, apart from the subsequent Tone, are almost completely absent. This gives strong presumptive evidence of a marine submergence which obliterated the older eastward-flowing drainage. The high surface or surfaces across which the Exe must once have flowed south of Exmoor were obviously cut largely in Permian rocks; superimposition from the Permo-Trias cover sufficiently explains the transection by the river of high ground both north and south of Tiverton and again north of Exeter. Further north, the Quarne-Exe headstream together with those of the Haddon, Bathern and Tone form a sub-parallel family of streams, of youthful aspect, entrenched below the surface of Balchin's 1,225 ft. surface. Professor O. T. Jones¹² has objected that, further west, the drainage is not "normal" to Balchin's suggested coastlines. The objection, however, does not survive closer scrutiny, and south of the Brendon Hills the normal relationship is undoubted and gives positive support to the marine origin of the summit-plain. Without a marine incursion at this level it is difficult, if not impossible, to explain the suppression of the older eastward flowing drainage. The ascription of so radical a change to "cross-tilting" would be highly implausible and flagrantly counter to established principles of drainage development.

In the country west of the Exe further south the evidence of marine interruption of drainage development is less decisive, or at least incomplete. The upper sections of the Teign and the Dart, regarded as the headstreams of former right-bank tributaries of the Exe, must have maintained their eastward flow well beyond the high ground of the Dartmoor granite and retained it until a relatively late date, as is manifest from the abandoned valley of the Dart east of Ashburton. We are left to conclude either that the higher level marine platforms were not developed in this part of the region or, alternatively, if they were in fact developed as Green contended, they were so disposed as to permit the eastward extension of the Teign and the Dart without sharp change of direction. Such a reconstruction may yet prove possible but our present evidence does not suffice to justify it.

East of the Exe no such difficulties exist, for the dominant southward-flowing drainage is consistent in its lines with the presence of the series of marine platforms claimed by Green.¹³ Even if the marine origin of these surfaces were denied, it is important to note that they are, beyond question, Tertiary surfaces, cut in Cretaceous rocks and the absence of corresponding features in the more westerly Palaeozoic terrain would be quite unaccountable.

The conclusion therefore to which our brief survey points is generally favourable to the marine hypothesis, though local discrepancies remain to be explained, and there is some evidence that parts of the central section of the peninsula may have escaped submergence at the higher levels. The evidence certainly does not

¹² In discussion on W. G. V. Balchin *op. cit.*, pp. 473-4.

¹³ J. F. N. Green, *op. cit.*, 1949.

support the supposition that the land-forms of the area have been exhumed largely intact from beneath a Permo-Triassic blanket. Nevertheless the former wider extension of the cover is a factor to be reckoned with. The high scarp-like feature which bounds Exmoor on the west and south is strongly suggestive of the front of a desert upland rising above a "pediment" plain and the same may possibly be true of parts of the steep margins of Dartmoor. This would imply that parts of the plateau surface at 800-1,000 ft. mark essentially surviving portions of old desert pediments modified in varying degree by sub-aerial or marine action. However this may be, it seems highly probable that the coasts of the peninsula, particularly on the north, retain in their main features legacies of sub-Triassic geography. It is exceedingly difficult to explain the consistent northward diversion of formerly southward-flowing drainage without assuming that the Bristol Channel depression dates from early Mesozoic times and was thickly filled with Triassic and later deposits. The proximate cause of the various episodes of river capture has been the rejuvenation following the withdrawal of the sea from the 400-foot coast, but this leaves unanswered the prior question of how the sea gained access to the area. A likely hypothesis seems to be the earlier excavation of the filling of the depression by a major river flowing west, of which the left-hand tributaries, excavating readily in the Trias, quickly reached the vicinity of the present north coast, marking roughly the margins of the old depression. Here they would have begun to compete with the southward-flowing drainage and prepared the way for the ultimate reversal of part of the latter, consummated only by the 400-foot submergence and the ensuing uplift.

It may well seem that the physiographic story we have sought to outline is at once too complex and too incomplete readily to serve the needs of elementary teaching. Let us beware however of the charge so often brought against us that we are interested only in the easy and the obvious. It is neither possible nor desirable to present, even at Sixth Form or First Year University level, a simple, neat, and final solution of the physiography of the South West, pre-digested and suitable for regurgitation. But this need not impede our own recognition that the physical no less than the cultural landscape has a past which informs its present. The area abounds in beautiful examples of physical phenomena of world-wide significance, but the examples are drawn from and contribute to a record of continuous evolution in which the hills are veritably shadows and "flow from form to form." Only in the light of the tale as a whole, as we have tried here briefly and incompletely to tell it, can the significance of such examples be fitly seen and only so can we isolate the gaps in our knowledge which are a challenge to future research.

THE PERSONALITY OF THE SOUTH WEST

ARTHUR DAVIES*

THE South West is a 'textbook' peninsula surrounded by sea on three sides and joined to the mainland by a narrow waist of about thirty five miles from Lyme Regis to the Bristol Channel. It is a very long peninsula. From Axminster to Land's End is nearly one hundred and fifty miles, more than from Anglesey to Cardiff, more than from the mouth of the Mersey to the mouth of the Humber. Measured in terms of time it seems even longer. It takes longer by train from Exeter to Truro than from Exeter to London.

The coasts of Devon and Cornwall and that part of Somerset within the peninsula, with their bays and drowned estuaries, are five hundred miles in extent and, save for the Okehampton district, no part is more than twenty miles from the sea. No part of England has such an extensive coastline in proportion to its area and population and some think that nowhere in the world are there lovelier coasts. This is an Atlantic peninsula, an Armorican peninsula of England, the land of the sea. Fawcett used to say that the most important boundary anywhere in the world was the line that divides land and sea. In the South West for most of its extent it is a line which unites land and sea. Perhaps in no other province of England are sea and land so closely wed.

THE COAST AND THE SEA

Three things have followed, all of fundamental importance in the evolution of the South West: fishing; maritime trade and overseas adventure and colonisation; the holiday industry.

The holiday industry is now the principal occupation of the South West, the numbers employed in it being slightly larger than in agriculture since 1950. Despite the increase in railway fares three things promise continued and even increased prosperity for this industry. "A fortnight's holiday with pay" makes it possible for Manchester to go further afield than Blackpool, and Leeds than Scarborough. Secondly, motoring has brought a major group of clients. Thirdly, the recent and remarkable development of motorcoach tours is filling the hotels of the South West and since such tours are less dependent on the weather they are extending the length of the season.

Fishing has played a very important part in Devon and Cornwall in the past. Here the deep water comes in from the Atlantic and Bay of Biscay, warmer and more salt than elsewhere around these islands. There are no shallows from which tidal surges stir up the mud in suspension. The water is free from dust and chemical particles settling from

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industrial England and free from the silt and pollution of the large rivers like the Mersey, Severn, Humber, Trent and Thames. It is clearer and sunlight penetrates deeper. For all these reasons it is more blue and for all these reasons too the fish life is more varied, for the marine pastures of plankton come drifting in from the great ocean to these coasts which go out to meet the sea. It is here that the boundary of warm water fishing represented by the pilchard overlaps that of cold water fishing of the herring type. Pilchards do not pass beyond Plymouth and the pilchard industry is restricted to Cornwall. Plymouth, Dartmouth and Brixham are important fishing ports for a variety of fish.

Maritime trade and overseas adventure and colonisation. It has often been noted that the calm waters of the fjords and Baltic Sea offered nurseries for navigation in which the Vikings learned to master the sea and seamanship. The drowned estuaries from the Exe to the Fal have likewise favoured human command of the sea. Fishing in its turn gave the necessary experience and practice for sailing the coasts of Europe and across the Atlantic, as in Brittany and Portugal. But fish as an article of food and trade also played a notable part in mediaeval trade and organisation. Specialisation in crafts, in woollens, in commerce and exchange of any kind is not possible unless there is somewhere in the economic system a food surplus available to feed all those not engaged in agriculture. Most of the maritime trading centres of Europe developed in the first instance from fishing groups. The Hanseatic league grew from trade in the Baltic herring and when the herring deserted the Baltic, Holland replaced the Hanse in maritime trade. It is said that Amsterdam is built upon herring bones. Amalfi, Pisa, Genoa, Venice and Portugal all developed maritime commerce from beginnings with a surplus of fish. In the South West fish and, as we shall see, an unusually large cattle population, gave the food surplus which made it possible for the region to specialise in tin mining and in the weaving of woollens and serges from 1300 A.D. onwards. The Plantaganet empire included Aquitaine and developed the ports of the South West to victual ships en route to Bordeaux. And gradually dried fish from the South West with tin and woollens became a major article of trade with continental countries, especially with Mediterranean lands. In return we received wine, fruits, nuts, olive oil, cork and oak bark for tanning: and hides and Baltic stores from the maritime regions of Northern Europe. The South West became the maritime gateway to England from Iberia, the Mediterranean and from lands across the Atlantic during the period from the fourteenth to the nineteenth centuries. The Newfoundland fisheries from 1560 on were virtually monopolised by Cornish and Devon ports as far as England was concerned and for the same reasons that Brittany and Normandy monopolised it for France. They stood in the seaways to the London river and the Seine basin. The Channel ports of Cornwall and especially Devon were on the regular sailing routes up and down channel for the galleys of Genoa and Venice *en route* for Southampton, London, Antwerp and

Bruges. The galleys picked up the stockfish (dried cod) at Dartmouth and Plymouth on their way back to the Mediterranean and so grew a trade in dried fish and pilchards which increased as the centuries went by. In these ways fishing led to maritime trade and cultural contacts with the most advanced and active nations of Europe by Tudor times. From these contacts there naturally developed rivalry with Spain in the Americas and considerable profits from privateering in Elizabethan times; and again, later, men of Devon and Cornwall were tempted to migrate overseas when fortunes were low in the South West. It is probable that no part of England has made a greater contribution, in relation to its population, to overseas settlement and long service in the armed forces than the South West. To some extent it has turned its face to the world and its back upon England at various stages of its development. Mackinder called it the marine antechamber of England and certainly from the fifteenth to the eighteenth centuries it played a notable part in English life.

MINERALS AND MINING

Igneous intrusions have forced up the main moorland masses of the South West, possibly underlying Exmoor and giving great surfaces of granite in Dartmoor, Bodmin Moor, Hensbarrow, Carnmenellis and St. Just. These have added beauty of mountain, moor and forested gorge-like valleys to the beauty of coastal scenery. Beauty of landscape is the natural heritage of those who are born in the South West. The clear air, free of dust and oily deposits and soot, gives a richness and brightness of colour unusual in Britain.

These igneous masses have deeply affected the human geography of the peninsula. It is this factor and not the Palaeozoic age of the strata which gives these moorlands their place in the highland zone of Britain. As Fleure insists, the highland zone has a further and intense region of difficulty in the great wet moorlands of the west. Extremely difficult for cultivation they represent regions of ancient pastoralism where old ideas and patterns of society linger long and change very slowly. The rainfall of Princeton is 84 inches a year on the average, and in one year reached 128 inches. It has been said that Dartmoor is the greatest uninterrupted moorland in England and Wales, for the Penines and Lake District have fertile glacial valleys which break them up.

The igneous masses by exerting great heat and pressures on older rocks have made possible the concentration of their mineral constituents into mineral veins which have given the South West its long tradition of mining and a special rôle in European life.

Tin and copper have been mined in Penwith in Cornwall from the Early Bronze Age, with ups and downs not yet fully explained or known. The industry was flourishing from 400 B.C. onwards as we know from the voyage of Pytheas of Massilia who visited Belerion and marvelled at its activity in the mining of tin and at the courage, great strength and skill of its seamen in light skinboats. The tin mining declined during the Dark Ages with the general collapse of Roman

commerce in Europe and the universal use of iron in place of bronze (tin and copper). From 1300 on tin mining developed again, tin being used for alloys for utensils and ornament of all kinds, for coinage and above all for pewter throughout Europe. In the first half of the nineteenth century Devon and Cornwall were producing most of the tin and copper of the world. Then came the rapid exploitation of rich and easily worked tin in Malaya and Bolivia and copper in Chile and the Rhodesias. The tin mining industry dwindled until now only two mines are working, both in the Camborne-Redruth region. There is still ample tin in Cornwall but it lies deep at levels where pumping out the flow of water is too expensive because of the present cost of coal. If atomic energy will give sufficiently cheap power Cornish tin can be worked again at a profit.

The catastrophic decline of Cornish tin working since 1860 has led to two major consequences. First was an exodus of Cornish miners overseas to the new lands and Dominions and the resulting depopulation of the mining regions of Cornwall. This was accompanied by a movement back to the land, where miners became smallholders and helped to develop more intensive production than has been the case in Devon. The second major consequence is that Cornish mining genius, the product of nearly three thousand years during which it led Europe in this field, has gone afar to U.S.A., the Colonies and Dominions and South America and has played a significant part in hastening the mineral exploitation of the new lands of the world. This work is comparable to the contribution of the Huguenots in draining and weaving from 1600 onwards and has not hitherto been sufficiently recognised and acknowledged. "If there is a deep hole anywhere in the world at the bottom of it you will find a Cornishman, quite happy winning ore." This vast migration has not broken its links with its old home in Cornwall. Many come back to retire in these Armorican lands within sight and sound of the sea, making a not inconsiderable contribution to the economy as self-supporting retired people. This element in Cornwall brings a wide experience of the world to enrich the local pattern in life. In Devon retired service officers, colonial administrators, a host of writers and travellers add a sophistication and great experience of the world to counteract the provincialism of the South West.

It is especially during the last fifty years that *china-clay* working has grown to a considerable scale, clay being sent from the Hensbarrow pits to Par and Fowey and from Lea Moor in south-west Dartmoor to Plymouth. Rumour has it that a fortune awaits anyone who can find a really profitable use for the great white pyramids of gravel accumulating as waste after the fine particles have been washed out by water.

The most important single aspect of the personality of the South West is that something huge and ugly is missing. It has no *coal* and perhaps for that reason it has been fortunate. Coal and steampower from 1800 onwards ushered in the industrial age of factory production, cheap manufacture and the replacement of the older harmonious order of living by the stresses of an industrial society. The South West at first

was hit severely. Its great woollen industry, which left its heritage in the landscape in the improved church and domestic architecture of 1450-1600, had already been reduced by the continental wars under Marlborough and Pitt. Now it was cut off from its European markets by the Napoleonic wars, and from this blow and in the face of Yorkshire competition it never recovered. It had no steam-power to attract other industries. Later in time steamships replaced sail and steamships had no need to shelter in the harbours of Cornwall and Devon for weeks at a time waiting favourable winds. With their greater size they deserted the small ports and sheltered estuaries. But catastrophe was averted. Overseas emigration and trade in sailing ships increased up to 1880 to compensate for the decline of tin and woollens. The Newfoundland fishing increased greatly until 1900. And after 1880 the locomotive brought holiday makers to compensate the small ports and the coasts for their losses in maritime trade.

The simple fact is that the South West has come through the coal age with its essential quality and resilience unimpaired. In particular it has escaped some notable evils of nineteenth century industrialism: industrial slums and industrial climates, ill-planned sprawling towns and great conurbations with their overcrowding and problems of transport, health and amenities; dirt and ugliness built-in by man and too costly ever to be removed; class consciousness and divisions which disrupt society; the factory tradition and the tempo of the industrial and coal-mining life, with repercussions on physique, health, family life and limitations of environment, in which boys became tired little men underground and girls grew up too soon in factories. These things are no longer characteristic but they left their mark during much of the nineteenth century in the coal-mining and large industrial regions of Britain.

The coal age will pass into the atomic age of cheap electricity within fifty years and the South West can then profit by the mistakes of industrialism in Britain, Germany and U.S.A. without losing its best qualities.

CLIMATE

So much has been written about the climate of the South West that in this place a few points will suffice. This Armorican peninsula is south of and west of the rest of England. Its climate is Armorican i.e. it has more in common with Brittany and the Channel Islands than with the rest of the British Isles and it forms a separate climatic province. The rainfall is heavy over high ground but it comes in heavy downpours and the southern coasts are among the sunniest places in England. One feature is the short and mild winter which allows grass to grow ten or eleven months in the year. This has had very important consequences. In most of Great Britain the lack of winter feed for cattle resulted in the slaughtering of herds in autumn until the eighteenth century, when root crops helped to solve the problem. The meat was salted and the human diet lacked vitamins. Herds could not

multiply and the soils were not renewed with adequate manure and became less fertile. The cattle which lived until spring were weak with famine and had sometimes to be carried out to pastures. The reproduction rate was low and the quality of breed, bone, flesh and hide was poor. These restrictions led to the Catholic rule that no meat was to be eaten on Friday and reinforced the period of self-denial in Lent. In the South West grass grows most of the year and this medieval problem, the greatest agricultural headache of all Europe, was scarcely experienced. This fact helps to explain the early development of good Devon breeds of cattle and the increased cattle population and human population, with unusual vitality and prosperity in Devon and Cornwall from 1300 to 1800.

Another interesting result of the long growing season is the absence of hurry in the rhythm of life in the South West. Elsewhere dangers of hail or early frost or thunderstorms in regions of cereal cultivation exert pressures at time of harvest leading to great exertion, notably in the U.S.A. and Canadian prairies. Here there is no danger of frost and the economy is pastoral with emphasis on beef, not on milk with its daily time table. There is ample time to deal with everything without hurry. "It will bide." The sea too has its own majestic rhythm; twice each day it enters and leaves the estuaries and creeks and all the puny hurrys and scurryings of men cannot hasten it by one minute. One must accept the slow rhythm of nature. Drake was a true man of Devon when he said "Time enough to finish our game and beat the Spaniards too." That is the essence of temperament in the South West, unhurried and free from stress and tension, with quiet easy-going courtesy. Neurotics should not go to Harley Street for a cure: they should live six months in a Devon village!

POSITION

Its position makes this region remote from Metropolitan England though not remote from the maritime world save during the last seventy years. Remoteness from London and the lack of roads beyond Exeter have often enabled its people to escape or avoid collection of taxes and to escape military service and levies, for a war might be over before the levies of Devon and Cornwall could be assembled and moved to the points of danger in the border wars with Wales and Scotland or in the feudal struggles of England. It was not touched by the Wars of the Roses or the Plantaganet successions. When it engaged in struggle it was largely of its own choice, as when it defended Roman Catholicism after the reformation acts of Henry VIII and when it mainly supported the Royalist cause in the Civil Wars.

Its remoteness from south-east England has protected it from invasion. From Early Bronze Age times onwards the numerous invasions of England have come from the continent by way of south-east England. By the time that these culture groups had pushed their conquests and settlement slowly westward to Devon their initial antagonism and ferocity had mellowed and by diplomacy, rather than battle, came to

terms with previous inhabitants. Moreover the peninsula is protected landward by the marshes of Somerset, through which no road was made until late Tudor times, and by the heights and wilderness and forest of Exmoor and the Blackdown Hills which extend to the coast. For the rest it was protected by the sea. The Narrow Seas which have helped the invader to cross in a single day, without risk of losing control of his ships during darkness, end at the Cotentin-Portland region. West of this the Channel is a hundred miles wide with good prospects of a change of wind which would drive an invader's ships out into the Atlantic. The sea has thus been a great moat to protect the South West whereas from Suffolk to Hampshire it has helped invasions for it concealed the arrival of the invader until it was too late to mass defenders against him.

Thus by the time invading peoples reached Devon across southern England a basis of amicable agreement was usually possible. The Saxon and the Celt lived side by side in Exeter and Devon without difficulty and it was the church and its priests, not the sword, which brought Devon and Cornwall within the English realm. Four thousand years of relative peace and calm have helped in a lovely and favourable land to fashion a courteous, unhurried, somewhat old-fashioned but eminently successful and satisfactory way of life.

The variety of the resources of the South West has always operated to stave off disaster and poverty. When tin failed after 1860, migration overseas and maritime trade and increased fishing and china clay relieved the problem. When sailing ships gave way to steam, the railway brought the holiday industry. When the woollen industry declined, the enormous development of oceanic trade in sail from 1770 onwards brought a new income to the sailing ports of Devon and Cornwall. This is a region which has always had within it the physical and human resources to defy poverty and to adapt itself to change. It is a province of England of which men may well be proud.

THE SITE, SITUATION AND FUNCTIONS OF EXETER

A. H. SHORTER*

THE earliest known occupation of the site of the city of Exeter began about the year 50 A.D., when the Romans arrived in the South West. During at least part of the Roman occupation there was an agricultural and trading settlement at Topsham, four miles down-river from Exeter; and there was probably a signal station on Stoke Hill, at a height of about 500 feet above sea level and two miles north of Exeter. Thus the site of the city was not the only one in the district which was occupied in Roman times; but it was the most important, and there was nothing comparable in the South West. From Exeter it was possible to command the valley, the navigable estuary and crossing-places of the lower Exe, and to control and administer the region. We are reminded of the purpose of the occupation in the name of the place—*Isca* (from the river) *Dumnoniorum* (from the Dumnonii, the British people in the South West.)

The Early Sites

Three features of the use of the site of Exeter in Roman times are of particular interest to the geographer: the occupation of the valley gravels, the relation between the settlement and the river Exe, and the definition of the limits of the town (Fig. 1). The position, extent and character of the gravels must have been important factors influencing the choice of a site for settlement—the gravel area was easily approached along a ridge from the north-east, and from that direction came the Roman road; the gravels were comparatively level, they lay on a platform well above the river, they could easily be worked, wells could readily be sunk through them, and they were dry enough to be suitable for the foundations of timber buildings.

Further north there was higher ground, but this was less suitable for the building of a town; it consisted of the clays and shales of the Culm Measures; it looked down to a comparatively narrow portion of the Exe valley, and it was too far from the navigable section of the river. To the south-east of Exeter, in the direction of Topsham, there were gravels, but the land was lower and the hills were less easily defined and less able to command a convenient crossing of the river.

* Dr. Shorter is a lecturer in the Department of Geography, University College of the South West. The lecture here published was delivered to the Spring Conference of the Association on 21st April, 1954, and was then illustrated by 40 lantern slides; from these seven have been selected for reproduction here. During the lecture acknowledgments were made to Aileen Fox: *Roman Exeter* (1952), and W. G. Hoskins: *Industry, Trade and People in Exeter, 1688-1800* (1935), which are Monographs Nos. 8 and 6 respectively of the History of Exeter Research Group, published by Manchester University Press for the University College of the South West. Acknowledgments were also made in respect of maps.

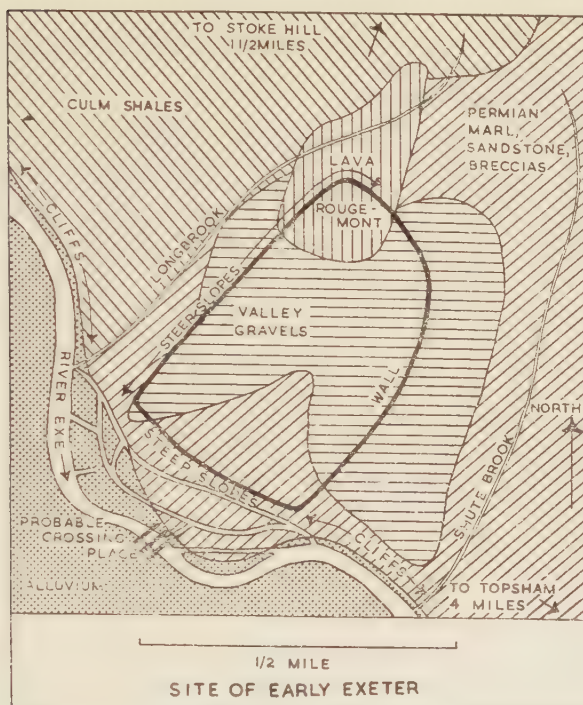


Fig. 1.

The chosen site terminated steeply on the south-western side, but it offered one approach, which was not too steep, directly down from the gravels to what was probably at that time the lowest convenient place for a regular crossing of the Exe. There the river had emerged from its passage through the Culm Measures, but it was still narrow and its waters moved comparatively slowly, in all probability being checked by the small islands. On the left bank, up- and down-stream from the locality of the bridge and islands, the river was immediately overlooked by cliffs of Culm shales and Permian rocks respectively; neither place was suitable for a direct approach to a crossing. Still further upstream the Exe valley was rather cramped in the Culm Measures to the north of the point where the Long Brook entered, while down-river from Exeter the valley opened out considerably and presented the difficulty of a greater width of marsh to the west of the river. A site much above or below Exeter would not have had immediate access to and control of both the crossing-point and the head of navigation, which were then probably about or just below the position of the later bridge.

The site possessed certain natural advantages for those who had to define, plan and administer *Isca*, and at least consider the possibility of having to defend the town. The earliest settlement appears to have been open; the first enclosure consisted of an earthen rampart and

ditch, but by about the year 200 a wall had been built which enclosed an area of about 93 acres. For much of its length, the alignment of this wall was readily decided. On the south-western side it covered the approach to the crossing and for the most part went along the top of the steep slopes which overlooked the islands, the crossing and the quay; the two corners of this section were fixed by the Long Brook valley and the bend in the river at the eastern end of the islands. On the north-western side, the line of the wall was determined by the steep slopes of the Long Brook valley, and the northern corner by the need to include the highest part of the lava hill (later called Rougemont) in the town. This hill commanded the eastern approaches, and fortunately so, for no steep valleys comparable with the Exe and the Long Brook were to be found immediately in that direction. The fourth corner of the wall appears to have been set inside the limit of the level gravels and at a point where the outline of the town would be approximately rectangular. The ground did, however, fall away to the Shute Brook, and the general direction taken by that valley may have influenced the alignment of the remainder of the wall; but to have carried the town's limits further out to the steeper slopes of the west side of the Shute Brook valley itself would have enlarged *Isca* far beyond the area that was necessary to its functions in Roman times.

The Situation and Functions of Roman Exeter

Isca was situated at the point where one of the great Roman roads approached the Exe, and it was the last town in a south-westerly direction from London. To judge from the large number of pre-Roman hill forts which have been found in mid, south and east Devon, the Exeter district may have been well populated, compared with much of the rest of the South West in Roman times; but there is archaeological proof that there were also settlements far to the west of Exeter, for example a villa near Camborne and villages in the Land's End peninsula. There must also have been British farmsteads dotted about the South West, and at least some roads and river-crossing points west of Exeter.

It is suggested that the principal functions of *Isca* were fairly closely linked with the considerations of site and situation discussed above. Firstly, it is probable that the South West was tributary to the town, and that officials worked in and from it. Secondly, although *Isca* was not centrally placed amid the territory of the Dumnonii, there was no better situation in relation to the distribution of those people; and if it was the centre of a comparatively well-populated district it would have local as well as regional functions. Thirdly, Exeter and Topsham were well situated, by reason of the shelter and navigation afforded by the Exe estuary, to carry on a coastwise and overseas trade. The paucity of Roman evidence from much of the South West supports the view that most of the contacts with the settlements in west Cornwall were by sea. Goods imported via the Exe could be comparatively easily sent to Roman centres inland by means of the

road which ran east from Exeter. Fourthly, the Dumnonii in the villages and farmsteads appear to have had a relatively undisturbed existence during the Roman occupation, and the peaceful conditions and the position of *Isca* made it possible for the products of both upland and lowland districts to be gathered and traded in the town. Fifthly, *Isca* was essentially a civil settlement. A Roman campaign beyond the Exe was not required, and there is no evidence from Exeter or the South West of a military situation during the occupation which would have necessitated the building of a frontier wall, or a system of military roads and forts west of Exeter, or a legionary headquarters and fortress at the town itself.

The choice of the site and situation of *Isca* had very important consequences for the South West. It was not merely a question of the selection of a site somewhere on the line of the Exe, or of the juxtaposition of upland and lowland near that line. Here was chosen not only an attractive site for settlement, near a river crossing and a head of navigation, but also a contact point at or near which there were interlocked several different kinds of rock and soil, marshes and timbered slopes, rich arable and grazing land, valleys and an estuary, steep and gentle slopes, broken and flat country, a fragment of the highland zone of Britain with the hills and valleys of the lowland zone. By reason of the focus which at different times and with different means of transport it has offered to routes following the ridges, the gaps in the hills around, and the valleys of the Exe Basin, the situation of Exeter has proved to be well suited to the functions of a centre for much of mid, south and east Devon, and for knitting together and expressing the various activities of those districts.

Cathedral, Castle and Guildhall

Although no proof has been established of the continuity of settlement at Exeter from about 380 A.D., when the Roman occupation ended, to the peaceful arrival of the Saxons about the year 660, it is probable that part of the town was inhabited by British folk and that until the 10th century they continued to live there, while Saxons occupied other parts. A few of Exeter's churches were dedicated to Celtic saints, for example Kerrian and Petrock, and it is possible that the predecessor of the monastery which was on or about the site of the Cathedral in Saxon times was a Celtic foundation from Glastonbury.

In 1050 the bishopric was transferred from Crediton to Exeter. This action must have been strongly influenced by Exeter's situation and the fact that it was a defended site. From it followed the development of one of the city's principal regional functions as a centre of ecclesiastical ministration, and of one of its most distinctive sites, for under the Normans began the building of a great cathedral in its own setting at the head of a small valley and on the spot where stood the Saxon church which had been taken over by Bishop Leofric in 1050.

The two towers of the Cathedral are one reason why we recall the

attention which the Normans gave to Exeter and its region. Another reason is that from the data given in the Exon Domesday (in the Cathedral library) it is clear that in the 11th century the Exeter region was ahead of much of the rest of Devon in agricultural activity and prosperity. To ensure control of Exeter and its region, the Conqueror caused a castle, a characteristically aloof, dominating strongpoint, to be built on the lava hill (Rougemont). Thus in their quite separate settings, each of which occupied a large area within the city wall, the buildings of the bishopric and the monarchy became integral parts of the Exeter scene (the functions of the Castle were eventually transmuted to the Devon Assize and Quarter Sessions, and the Devon County Council). On the level High Street there was soon to be added a building for the administration of the town itself; the earliest records of a guildhall, civic seal and mayor are from the 12th and early 13th centuries.

Exeter as a Centre of Trade and Industry

In the 13th century the Courtenay family, who had control of both banks of the Exe below the city and were jealous of the maritime prosperity of Exeter, had the river dammed at Countess Weir, two miles downstream, and thus compelled ships to use the quay at their own manor of Topsham. It was not until the 1560's that ships returned to the city's quays, with the cutting of the first section of the Exeter Canal. Despite the long interruption of its direct access to the sea, Exeter was, however, already playing an important part in industry and commerce. The artisans were localised chiefly in the western districts, both inside the walls and about the bridge; the principal markets were in the Fore Street-South Street-High Street area, and there were probably other traders at the principal approaches to the city, particularly outside the East Gate and beyond the bridge.

A score of churches served the crowded parishes whose people were dependent on the functions of Exeter as an administrative centre, a market and supply centre, a port and a focus of industry and trade, particularly in woollens. The mills and cloth-racks shown on the 16th, 17th and 18th century plans of Exeter illustrate the localisation of a woollen industry and trade in the western districts. Exeter's greatest days as a centre for the serge industry and trade began in the 17th century and lasted until the 18th. The spinning, weaving and fulling industries of a large part of Devon were connected with or focused upon the city through her functions as a trader in wool, as a centre for dyeing, finishing, packing, selling and exporting the cloth, as a manufacturer, and as a source of capital for the provision and insurance of industrial equipment.

During the 18th and early 19th centuries the woollen industry and trade declined, for reasons that are well known—the wars, the loss of the principal markets, the lack of coal deposits within the region, competition from Norfolk and the West Riding of Yorkshire, and so on. The activities of the East India Company enabled the

Devonshire woollen trade to revive somewhat up to the 1830's, but during the course of the 19th century most of the remaining woollen mills had to close. There are now only a few woollen factories in Devon, but wool sales are still held at Exeter.

The Survival of Exeter

It is often asked why, in view of the collapse of the woollen industry and trade on which the city had for so long and so greatly depended, she was able to continue as an important settlement and, indeed, almost to double her population between 1801 (17,000) and 1841. A reasonable answer can be given from local, contemporary sources, without minimising the serious effects of the decline of the woollen trade or losing perspective of the developments which were occurring elsewhere in Britain during that time.

The first part of the answer is that Exeter was still the centre of a large, rich agricultural region, which had the highest density of agricultural population of any region in Devon. Secondly, that region had industries other than woollens, and of these at least tanning and paper-making were by no means finished; indeed they were being carried on in numerous establishments in the early 19th century. There were several tanneries and leather works in or near the city, where there was also a trade in hides, leather, oak bark and other tanning materials. Many of the Devonshire paper-mills, the first of which (at Countess Weir) began work about 1638, were located on the rivers Exe and Culm and their tributaries; Exeter was therefore well placed for a paper trade, which included foreign and coastwise imports of rags and other stuff, and the shipping of paper.

Thirdly, attempts were made to diversify the industries of Exeter, particularly between Head Weir and Trew's Weir and between the west wall and the river, where there were several mill leats and industrial buildings and stores; in that quarter the legacy of industrial establishments and warehouses from the 18th and 19th centuries can still be seen. Head Weir fulling-mill was converted to paper-making in 1798; additional foundries, a match factory and a cotton factory were among the new establishments, some of which, however, had only a short life. Apparently not all the opportunities were taken. According to a report in the local press in 1821, it appears that some of the lace manufacturers who left Loughborough because of the riots directed against their machinery, might have settled in Exeter in or about 1816. Heathcoats, the manufacturers of lace, stockings, etc., were said to have wanted the disused cotton factory, but the price asked for the building was too high and they eventually purchased premises at Tiverton, where their manufactory has become one of the most important in the South West. Later inquiries by lace makers who branched off from Tiverton also proved abortive for the same reason, and that firm went to Barnstaple. The cotton factory eventually became, and remains, a paper-mill, but the fact that it had earlier been sought by the lace-men, as their first choice in the region, is a favourable commentary not only on the suitability of the building

but also on the advantages of the geographical situation of Exeter as they appeared to industrialists who thought of establishing themselves in Devon at a time when few large industries were being introduced.

The other principal reasons for the continued importance and growth of Exeter were largely bound up with traffic and road improvements and her greater accessibility (Fig. 2). Plans for waterways



Fig. 2.

inland from Exeter or Topsham were never carried out, but road transport was increasingly important, mainly because of the activity of the Exeter Turnpike Trust from the 1750's onwards, and the growth of traffic to and from the packet station of Falmouth, the naval base of Dock (Devonport) and the coastal resorts. Part of the transition from packhorses to waggons used by carriers centred on Exeter had occurred early in the 18th century, and there was now a great coach traffic too. Many of the inns, for example those in and about South Street, High Street and the East Gate were connected with the waggon and coach traffic, and many people and horses were employed by it. Some of Exeter's traffic problems at that time are indicated by the demolition of the city's gates between 1769 and 1819 and of those of the Cathedral Close between 1812 and 1823, and the provision of a new bridge and a new high-level access to it from the hill of Fore Street.

The city also became important as a travel, social and residential centre. Exeter did not develop as a spa, but it was attractive to the leisured and the retired, and to those who, because of the wars with France, could not travel on the Continent. It was the centre of a district which had beautiful scenery, a mild climate, comparatively cheap living, and comfortable abodes such as "The Hotel" (now the Royal Clarence Hotel). As it was now more accessible from many parts of the South West, the city was visited by a larger number of landed folk who kept town houses there. The buildings erected from

EXETER IN RELATION TO RAILWAYS



Fig. 3.

the 1780's to the 1820's included some of Exeter's most pleasing domestic architecture, for example in Southernhay and Barnfield Crescent.

The Present Functions of Exeter

The above are some of the reasons for the continued importance of Exeter as a centre up to the arrival of the railways (Great Western, 1844, and London and South Western, 1860) (Fig. 3). Instead of the turnpikes, the railways now provided the main lines for traffic through Exeter as the gateway to much of the South West. In its turn, motor transport has not only greatly enhanced Exeter's function as a gateway—an enhancement which is sometimes an embarrassment because of the very heavy traffic, which has necessitated a by-pass—but it has also, together with the regional rail services, enabled her to extend and develop her activities as a market, and a distributive, shopping and supply centre. The five leading functional groups (by numbers employed) in the Exeter area are: distributive trades, miscellaneous services, transport and communications, professional services and public administration and defence. These and other groups show that much emphasis must be placed on a wide range of services which are rendered by Exeter, in some cases to various parts of the South West, in others the county of Devon, and more locally, mid and east Devon, and the environs of the city.

Six of Exeter's important functions—as a shopping, market, bus, tourist, residential and educational centre—are well known and require no further stress. Other functions which are closely related to the prestige of the city and its accessibility by road and rail should

not be forgotten ; an example is seen in the numerous headquarters, offices and meetings of many organisations, including county and district societies and associations.

Only a few of the geographical frameworks and patterns of transport and regional services which have formed around Exeter can be illustrated here. A feature of the carrier traffic (Fig. 4), which is, of course, on a much smaller scale than the district bus services, is the

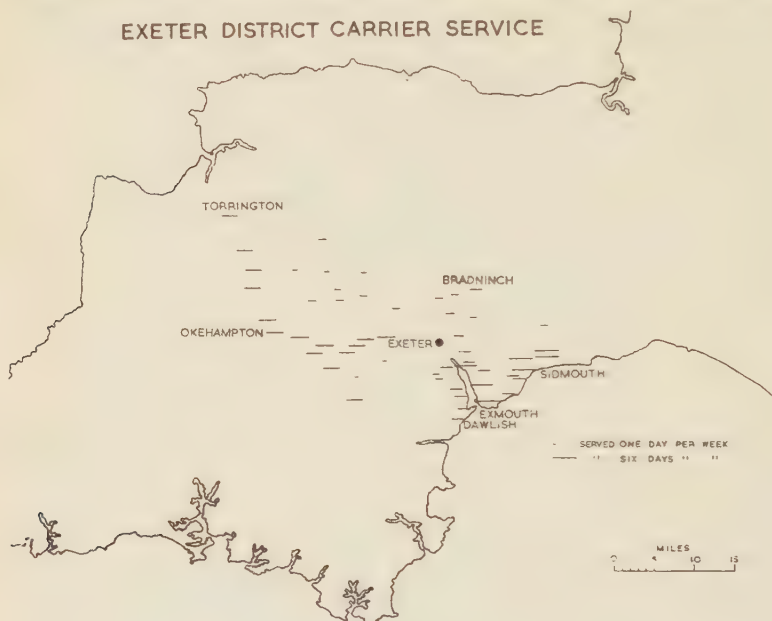


Fig. 4.

conveyance provided both to towns and villages near Exeter and to those which lie some distance to the west and north-west. The regular deliveries by a large, old-established, Exeter shopping firm provide a somewhat different regional service pattern, with rather more emphasis on the conveyance to towns and villages in east Devon (Fig. 5).

The large clinical area served by Exeter contains nearly 500,000 people (Fig. 6). Exeter itself has large hospitals (Torquay and Barnstaple have others, and there are many local hospitals) and is a focal point for hospital management and administration, consultant services, orthopaedic and other specialities, also the services of the public authority. The telephone area which is controlled and administered from Exeter has out-stations at Honiton, Newton Abbot, Torquay, Okehampton and Bude, which exercise engineering sub-control ; the accessibility of Exeter (particularly by road) from west Devon and north Cornwall and the barrier effect of Exmoor and Dartmoor have been among the important factors which fashioned the regional service framework. The area served by Exeter's evening

newspaper reflects the use of rail and road transport for distribution as far as north Devon and north Cornwall, and into parts of Somerset and Dorset. The limits of this area are of course also related to the availability of evening newspapers from other presses, including for example, on the north-eastern, eastern and southern boundaries, those of Bristol, London and Torquay respectively.

Exeter has a considerable range of industries ; none is very large or very heavy, but they are interesting because of their diversity,

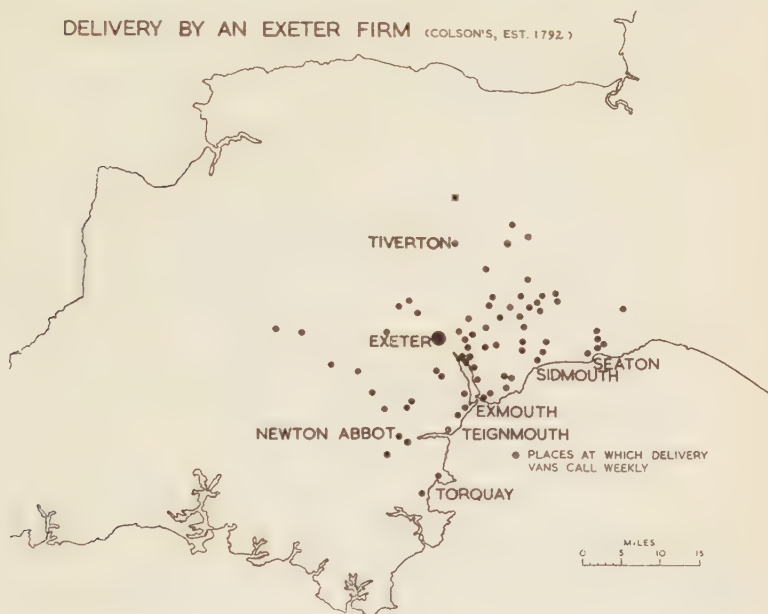


Fig. 5.

the degree of specialisation, and the factors which have helped in the survival of some old establishments and in the attraction of new industries. The largest unit has a staff of about 1,200 and produces gas meters and castings, plates and other equipment for gas works plant in various parts of the country. Among the old industrial establishments are other foundries, paper-mills, breweries, a tannery and leather factory, a church furnishing firm, and printing works ; and among the newer industries are flooring- and cork-making, structural engineering and the repairing of electrical equipment. The importance of some of Exeter's industries, for example brewing, engineering and the repair and service of vehicles, is closely related to her geographical situation ; but while some have a long association with local and regional markets, many now have distant sales outlets too, including London and the export trade.

Fuels and materials for her electric power station, gasworks, transport and industries have to be brought to Exeter by rail, road

or canal, the last being used mainly for coastwise traffic in coal, petrol, cement, etc., and for the import of timber. About 310 small ships with a total of about 42,500 tons, use the port during the year, and some two-thirds of these reach Exeter (some coal and timber is discharged at Exmouth Dock), bringing useful supplies for the gas-works, motor trade and building industry.

With the diversification and enhancement of her functions, the increase in traffic and the pressure on building space, Exeter's boundaries have been pushed far beyond the original limits (Fig. 7). Most



Fig. 6.

of the principal shopping areas are within the walls, but there are others in the old extra-mural settlements, for example St. Sidwell's, St. Thomas' and Heavitree, which have been absorbed into the city. The University College is developing its Streatham Estate about a mile from the city centre. Post-war housing development has extended the built-up area, notably eastwards and south-eastwards, in the general directions of Pinhoe and Topsham respectively. Modern industrial development has taken place beyond the old west quarter, across the Exe to the head of the canal, here and there along the railways, in the St. Sidwell's district, and on the two new estates planned for industry, at Marsh Barton and Pinhoe Road.

As a result of the air raids in 1942, when about 400 shops, 150 offices and 1,500 houses were destroyed, and many other buildings were damaged or destroyed, Exeter has had to undertake the great task of rebuilding large commercial and residential areas. The progress



Fig. 7.—City of Exeter, 1954.

which has already been made in reconstruction and in the building of new housing estates has carried Exeter well towards recovery, indeed advancement, of her position as a great centre, whose population is now over 76,000.

FIELD WORK IN SCHOOLS: A SAMPLE TRAVERSE IN EAST KENT

ALICE COLEMAN*

FIELD work, that increasingly vital part of geographical teaching, is an art in which abstract advice on method may be less useful to teachers than the provision of subject matter and the outline of suitable routes with grid references of good viewpoints and rock exposures.¹

The traverse presented here (Fig. 1) has been carried out with a cycling party of sixth-formers leaving Ramsgate at 9 a.m. and dispersing from Reculver at 4 p.m., but for most purposes only a small selection of this data would be used. It is offered as a sample of the general organization of field material. The use of the O.S. one-inch, New Popular edition, sheet 173 in conjunction with the text will assist the reader.

RECOMMENDED HALTS

1. *Pegwell Bay. The cliff top at a tiny promontory, 354644*

The sweep of the coastline facilitates map orientation and ensures that the pupils have accurately located their position.

The main observation is the close correlation between rock type, relief and coastline plan (Fig. 2). North of Pegwell Bay is Chalk terrain. Chalk cliffs rise towards Ramsgate, and behind the viewpoint the fields curve smoothly to the relatively high ground of the Isle of Thanet, which runs eastward to the promontory of the North Foreland (not seen). South of the bay there is again Chalk country culminating in the long level skyline of the North Downs. This too projects eastward to a cliffed promontory, the South Foreland. Features common to both Chalk tracts are thus excellently illustrated.

Between the two forelands is the recess of Pegwell Bay, which can be correlated with the presence of relatively weak rocks, the Lower London Tertiaries. These are in large measure masked by alluvium which supports low-lying marsh pasture and is traversed by the Stour, whose mouth can usually be seen as a silvery streak. The Lower London Tertiaries fringe the alluvium on both sides but are not clearly discernible from this point, even though it is located on them. A geological map should be displayed.

Sandwich, Deal and, in exceptional conditions, the French coast are visible.

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¹ A recent pamphlet providing information of this kind is *Geographical Excursions in and around London*, published by The University of London Institute of Education and reviewed on p. 307 of this volume of *Geography*.

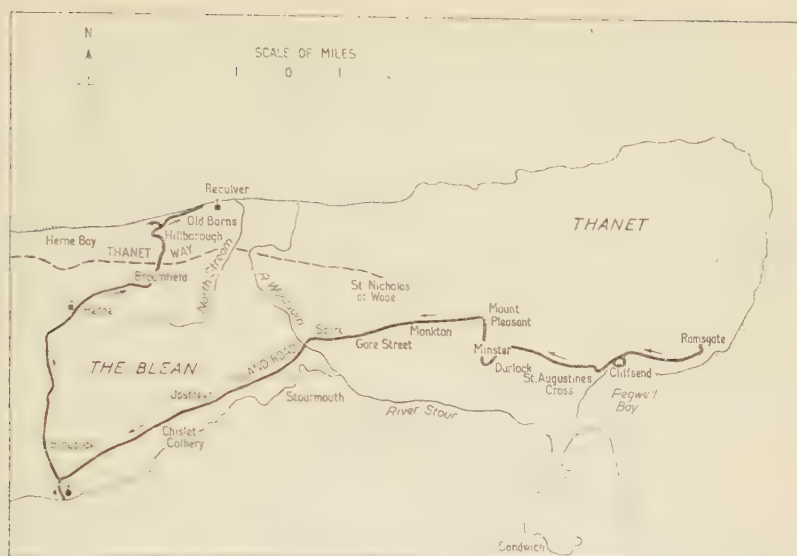


Fig. 1.—Route map.

2. The Shore, 355644

A cliff descent by a small gully allows access to the Chalk (Fig. 3a). The major regional structure and the rôle of a small shingle spit are the main points here.

The Chalk passes beneath the Tertiary Beds and marsh to link Thanet and the Downs by the buried Wantsum syncline. Thanet is a complementary antiform. The Chalk cliffs have been eroded mainly by wave attack, but partly, also, by solution. Chalk dissolved in rain or seawater runs intermittently down the cliff face, on to which it is then temporarily precipitated as a powdery coating. This coating obscures the bedding planes. A further effect of solution is the rounding of Chalk pebbles on the beach: these should be contrasted with the more resistant flints which retain their irregularities much longer. It is also noticeable that flint pebbles are just as numerous in the beach as chalk pebbles despite the fact that there is an overwhelming preponderance of Chalk in the cliffs from which both are derived. This again testifies to the fact that Chalk is more quickly dissolved and eroded than flint. In addition to the erosion at present in progress the Chalk suffered denudation before being covered by Tertiary Beds. The resulting *unconformity* can today be spanned in a handsbreadth, but it represents the events of millions of years. The sudden lithological change would lead us to suspect this, and the time gap also saw remarkable biological changes—the demise of Mesozoic ammonites and dinosaurs and the onset of Tertiary dominance of mammals and flowering plants. Alpine earth movements buckled both formations into the Wantsum syncline and the Thanet and North Down upfolds. The Tertiary Beds have since been eroded from the two crests and

reduced to narrow bands flanking the alluvium. Hence, structure has influenced the distribution of outcrops and, through them, the relief and coastline plan.

This classic cliff section has been much visited by geologists. However, it is becoming progressively obscured, owing to the shingle spit. This spit was tossed up near the unconformity in a storm during the war. Its top lies above high tide level, as witnessed by the establishment of vegetation, which has also colonised the hollow behind. Consequently the spit functions as a low barrier which protects the cliff from coastal erosion. Weathered talus is no longer swept away but accumulates as scree fans and excellently illustrates the conversion of cliffs to slopes. (In detail, the unconformity is complicated by coombe rock, gravel, brickearth and downwash discolouration. The final descent of the Chalk is also obscured by talus. These points would be ignored except with an advanced class.)

3. *Foot of Promontory, 354644*

The cliff material can be examined by climbing up the talus slope. The stratigraphical succession should be discussed and this lowest Tertiary member identified as Thanet Beds, which here occupy the whole height of the cliff except for the drift of the top.

Brickearth (c.2 feet)	}	Recent drift (QUATERNARY)	
Gravel (c.3 feet)			
Unconformity			
London Clay (480 feet)	}	Eocene	(TERTIARY)
Oldhaven Beds (20 feet)			
Woolwich Beds (25 feet)			
Thanet Beds (100 feet)			
Unconformity			
Upper Chalk		Cretaceous	(MESOZOIC)

The Thanet Beds, here in their type locality, are a clay or somewhat sandy clay, which may be tested by rubbing a sample for fineness. They give rise to a fertile, cultivable soil.

The drift overlying the Tertiary Beds indicates the more recent history of the surface. The gravel was river laid, while the brickearth was deposited by glacial winds. The Ice approached within some thirty miles of this locality and its peripheral gales transported fine dust from the bare ground in front of it, for many miles. Much was carried across to France, where, as "limon" it is much thicker than here. Brick-earth shows vertical jointing, and like the Thanet Beds forms excellent arable soil.

Immediately west is a small lagoon ponded back by the spit. Overgrown with seaweed and saltmarsh plants, it is clearly destined for silting by sand and vegetation debris.

4. *Western End of the Spit, 351643.*

The principles of coastal change are illustrated here. Proof of the

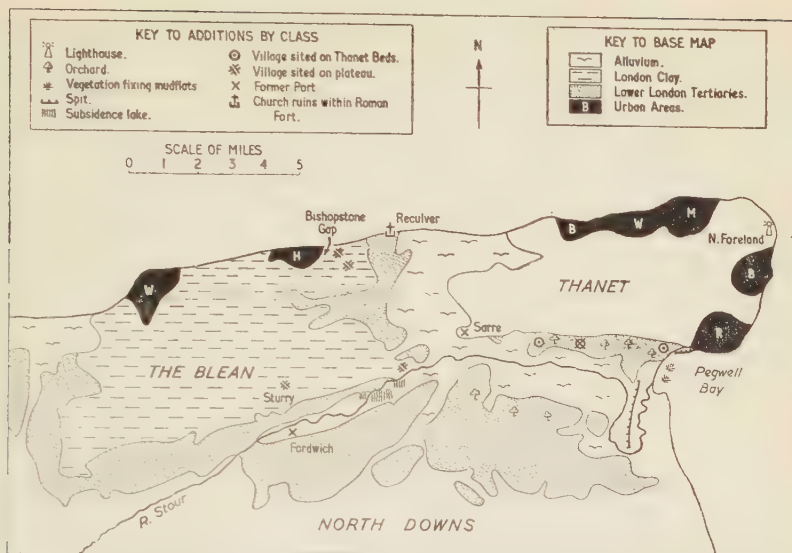


Fig. 2.—N. E. Kent base map (intended for duplication) with samples of individual field additions.

westward extension of the spit is provided by four facts, which are indicated in Fig. 3.

- Chalk and flint pebbles have travelled from an eastern source.
- The calibre of the spit material grows progressively finer westward until it is virtually all sand.
- Material is piled higher on the *eastern* side of the drainage outfall pipe (351643).
- Screes lower, and the cliff becomes more vertical westward, in relation to the length of time the spit has been present.

The spit prevents erosion by the sea and, instead, builds the coast out a little. Its future extension across the whole bay will make the coastal indentation less pronounced. Another type of building is the deposition of coastal mud at the mouth of the Stour. This has already shallowed the bay so much that tides recede well over a mile and vegetation has begun to fix the landward fringe of the flats.

As the promontories are eroded back and the bay infilled, a straight coastline will ultimately be achieved. This will be a state of equilibrium, at least temporarily.

From predicting the future we can turn to deduce the past. The promontories must have been projected further and the bay have been more deeply indented. We know, in fact, that the Downs ran on out to sea to join the Boulonnais Chalk before the final opening of the Straits which is believed to have taken place in about 7,000 B.C. and also that Pegwell Bay penetrated so far inland that it formed a through Strait to the other side at Reculver, leaving Thanet as an island. The yellow-green marshes may be visualised as the channel through which Roman

galleys sailed, but which gradually became choked with mud just as Pegwell Bay is being silted today. Beach material has also assisted. The modern spit has its earlier counterpart in the Stonar shingle spit which sites the Ramsgate-Sandwich road, a little inland. Reference to the map shows the Stour's gigantic "meander" around the Stonar spit and the large pond left after excavation of shingle for ballast.

In the cliff near the drainage outfall and about ten and fifteen feet above the beach are two bands of "doggers" (large nodules of hard flaggy sandstone) which overhang the softer clay.

Some of these details can be entered, as conventional symbols, on simple duplicated base maps. Fig. 2 gives examples of the type of annotation to be encouraged among the class.

5. *The Hugin*, 351643

The steps near the drainage outfall lead to the *Hugin*, which although not geographical is of local interest. It was rowed across the North Sea from Denmark to Broadstairs in 1949 by bearded Danes dressed as Vikings. This "invasion" was successful as an international gesture, but as a commemoration of the fifteenth centenary of the landing of Hengest and Horsa at Ebbsfleet it was historically inaccurate. The Jutes who disembarked on the Stonar spit in 449 (Hengest and Horsa as individuals may be mythical) were neither Danes nor Vikings, who came 350 years later, nor did they come from Jutland, but from Germany, where they were associated with the Angles and Saxons. They were hired by the British king Vortigern as allies against the Picts and Scots, in return for which they received the Isle of Thanet. Later they established the Kingdom of Kent.

6. *St. Augustine's Cross*, 339641

According to the well-known story, it was the sight of fair-skinned English boys in the slave market in Rome which determined Augustine to bring his mission to Kent in 579. He was welcomed by Ethelbert, King of Kent, whose wife was already a Christian. His landing site cannot be accurately vouchsafed but its traditional position three-quarters of a mile inland is a reminder that Thanet was then still an island.

The cultivable texture and well-drained condition of the Thanet Beds have favoured their devotion to market gardening, and (not immediately visible) fruit. It is useful to warn the class to watch, during the ensuing longitudinal traverse, for any topographical or land use features correlative with the three parallel outcrops of Chalk, Thanet Beds and alluvium.

7. *Southfacing Gate*, 324647

The Chalk rises to the north with rounded contours in large unhedged arable fields. Cereals predominate and Thanet barley is renowned for its malting quality. There is also market gardening but no pasture.

Below there is a sharp break of slope with the *Thanet Beds*, a flatter ledge with enclosed fields and numerous cherry orchards. This

is good cereal land : one must not invariably expect fruit. But fruit is profitable and a young orchard north of the road shows that planting still goes on. The only pasture is sheep grazing beneath mature cherry trees.

The *alluvium* provides fattening pastures for cattle and sheep. These extensive meadows account for the lack of grass on the higher ground.

Which of these terrains most favoured settlement ? The Chalk is steep and exposed, the alluvium cold and delicately drained, but the Thanet Beds are flatter, sheltered and dry, and therefore the most suitable, e.g. Minster.

While passing through Minster (via Durlock to the station, and then up to Mount Pleasant) the class should seek evidence that will elucidate Minster's greater importance than Monkton, Cliffsend, etc., which are similarly sited on Thanet Beds.

8. *West of Mount Pleasant Cross-Roads*, 309658

Questioning on observations in Minster should reveal advantages derived from (a) Manston aerodrome—a really modern influence ; (b) the railway station—a junction for Ramsgate, Canterbury and Dover ; (c) comparison of street plans on the one inch map indicating that the coastal resorts are, in the main, younger than Minster, which at one time included all eastern Thanet in its parish. Therefore we must consider also what made its site desirable originally, in Saxon times. Because of Thanet's insular status it then lay on a sheltered inlet or "fleet," and functioned as a port. Its seventh century abbey, associated with St. Mildred, made it an ecclesiastical centre also.

The change of gradient between Thanet Beds and Chalk will inevitably have been noticed by cyclists, and is corroborated by a chalk pit immediately above the junction.

The aerodrome on the flat top of the Isle of Thanet is now visible, while westwards the Chalk surface rolls away in open arable fields. The ledge of the Thanet Beds below the viewpoint still carries orchards and settlement, i.e. Monkton. Further west is a fall towards the northern, or Reculver, branch of the Wantsum Channel, backed by the London Clay plateau of the Blean.

The top road began as a prehistoric and then Roman track using a dry route which also afforded the clearest views in this once-wooded country.

9. *West of Gore Street*, 273652

The Chalk ridge has now dropped considerably and has also bifurcated, one prong leading to Sarre and the other to St. Nicholas with its prominent Norman tower. Both these spurs project towards the mainland of Kent and both carry roads, which thus avoid long crossings of the marsh. The Gore Street to Stourmouth road also utilises a short crossing. This completes mention of all the four roads which lead out of Thanet.

The name Stourmouth recalls the former presence of the sea, in medieval times, six miles inland of the present mouth of the Stour.

10. *The Wantsum Bridge*, 254648.

Sarre was formerly a flourishing port on the Wantsum Channel and still has a Ship Inn. The medieval tides from Reculver and Sandwich met here and accelerated silting, so that island and mainland became linked with a low tide causeway which later carried a road, the Sarre Wall (now Island Road). The port was abandoned in the fourteenth century and its population decreased. Its church fell into disrepair and all trace of it has since been lost. The Sarre Wall hastened silting on either side of it. The Wantsum continued to shrink until all that remains of the broad channel is the tiny regulated stream beneath this bridge. From here attention can be paid to the small marsh fields and to the dykes which bound and drain them.

The railway, unlike the roads, uses a longer marsh crossing where easier gradients prevail.

11. *West of Upstreet*, 225628

The nature of the Blean Plateau is excellently demonstrated by the accordance of ridge level at the viewpoint with that north of the Sarre Penn valley. The gravel which caps the interfluvies permits arable cultivation and affords well-drained settlement sites, e.g. Upstreet.

12. *Chislet Colliery Tip*, 207619

A viewpoint on the southern brow of the tip overlooking the river is reached along a rail track past the three large wooden cooling towers.

The waste is mainly shale which weathers into fine laminae. Soil formation is proceeding slowly and pioneer plants have become established. Attempts were formerly made to plant trees, but practically all were destroyed by children. A fresh venture, with Scots pine, silver birch and alder is soon to be initiated, and it is hoped that, to avert further damage, teachers will promote a spirit of co-operation among their charges.

Chislet is at the northern edge of the concealed Kent Coalfield. Output averages about 11,000 tons a week.

Here, the Stour flood plain is scenically contrasted with the Wantsum marshes because mining subsidence has disorganised the drainage and caused a permanent lake of 175 acres (Fig. 1). The old banks of the river can still be seen winding through the water in double curves. The drowned land was formerly used as fattening pastures, and its loss naturally raises the question of reclamation. Part at least of the lake will be infilled with shale waste from the colliery and tipping has already begun. Eventually this raw new surface must be rehabilitated and rendered fit for cultivation.

13. *Sturry and Fordwich*

If fine it is pleasant to lunch on the river bank at Fordwich, 182599. Sturry station waiting room will serve if wet. The Stour is braided here, which necessitates a double bridging. Fordwich, like Sarre, was a busy port. For example, it imported the Caen stone which built Canterbury Cathedral. It held the palace of the Kings of Kent, it was mentioned in Domesday and it continued to have its own mayor and

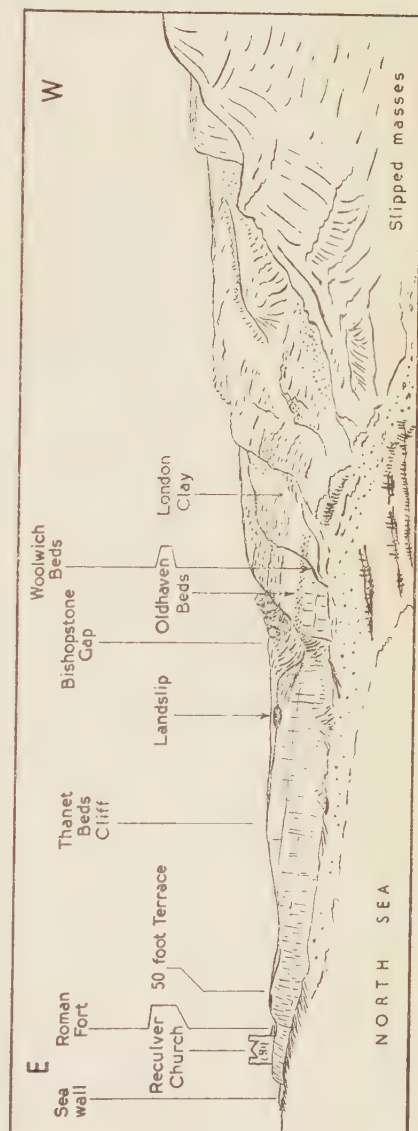
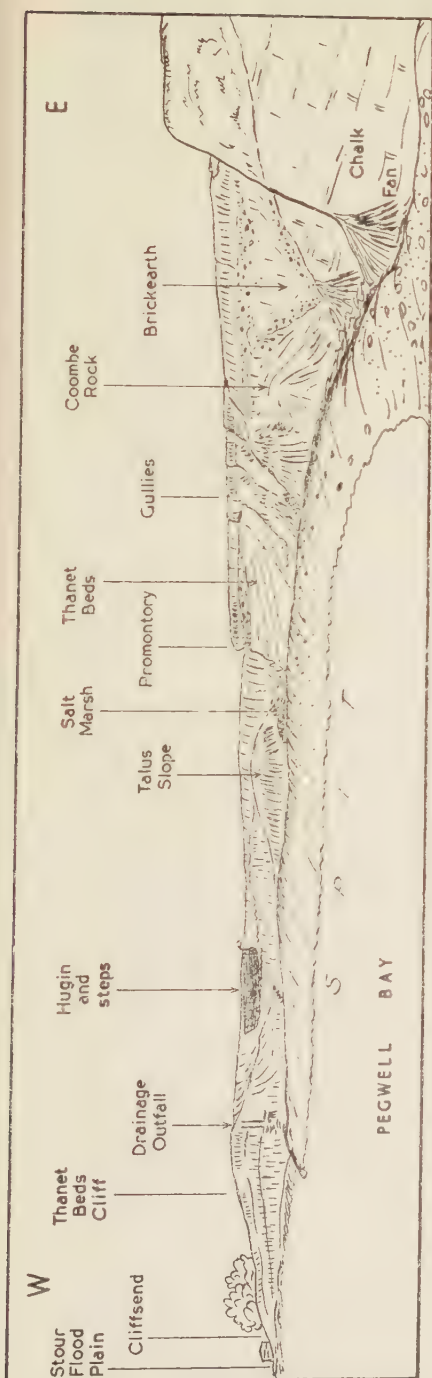


Fig. 3.—Field sketches, (a) (above) the Pegwell Bay Cliff Section and (b) (below) the Reculver Cliff Section.

corporation up to 1883. It now has only a few hundred inhabitants and its decline reflects the change of geographical values due to silting and the consequent loss of port functions.

The contiguous settlement of Sturry, on a low terrace north of the river, is also of Saxon foundation. It has now outgrown Fordwich, probably because it lies on the main road and railway to the Thanet towns.

14. *The A291 Road, 174616*

The gravelly plateau summit again favours arable farming and provides a site for a settlement, Broadoak, but the London Clay slopes of the Sarre Penn Valley are characterised by "bocage" scenery, i.e. pastoral country with well-grown hedges and hedgerow timber. Part of the extensive residual oakwood of the Blean forest, long protected as a royal preserve, is visible to the north.

15. *Herne*

Herne, with its weather-boarded houses and old church, was the forerunner of Herne Bay, the modernity of which is witnessed by a regular pattern of streets parallel to the coast or focusing on the station.

16. The route now reaches the *Thanet Way* via *Broomfield*, a plateau top settlement like Hillborough and Bishopstone. The Thanet Way was built in the nineteen-thirties to serve the coastal resorts. At 209676 a small box factory recalls the importance of forestry in the Blean.

17. *Bishopstone Ravine, 206687* (see Fig. 3b)

This strikingly rejuvenated cleft is similar to the chines of the Isle of Wight and, like them, reflects a rapid coastal retreat. The average rate of cliff recession here is 3 feet per annum; it is too rapid to permit grading of the stream profile, and a little waterfall occurs about 50 yards upstream. Permeability is also illustrated. In dry weather the water seeps into the sandy Oldhaven Beds above the fall. In wet weather it passes over the fall, at the foot of which it pounds a small overdeepened hollow. It may then lose itself in the Woolwich Beds or persist as far as the beach shingle, where it never makes a surface crossing. At low-tide it is seen re-emerging on the foreshore. Lithological control of valley form is witnessed in a marked break of slope at a pebble bed about 25 feet above the beach. This break separates vertical faces of Woolwich Beds and degraded slopes of the finer Oldhaven sand which tends to be wind eroded. The results of exposure to North Sea gales are also noticeable as well-grown trees in the shelter of the ravine are replaced upward by asymmetrical bushes suffering from physiological drought on the windward side.

18. *Cliff path, 211689*

The cliff top displays a scalloped outline which is due to rotational landslips in the London Clay. The slips usually occur during severe gales. They have not affected the Oldhaven Beds, which form a bench halfway down. Towards Herne Bay the westward dip has carried the London Clay down to form the whole cliff, which is badly

scarred by landslips and "mud glaciers." From this dip data, the eastward rise of the Thanet Beds from beneath sea-level may be anticipated. Stratigraphical relations are sketched in Fig. 3.

19. *Cliff path*, 221690

This fragment of the 50-foot terrace of the Stour is matched by others visible near Old Barns. Arable cultivation on the Thanet Beds here may be compared with the orchards of southern Thanet. Thanet is clearly seen across the marsh.

20. *The Shore, West of Reculver*, 225964

The cliff is composed of Thanet Beds, which here contains cemented sandstone in bands more continuous than the doggers at Pegwell Bay. Groynes have been erected to accumulate protective beach gravel and so arrest coastal erosion. Longshore drift is westward, as evidenced by the piling up of material on the eastern sides of the groynes, and also by the predominance of flints from Thanet. This correlates with the dominance of N.E. winds from the direction of longest fetch.

21. *West of Reculver Church*, 225964

Reculver Church was founded by the Saxon king Egbert in 669 and rebuilt in the 13th century. Coastal erosion undermined it and in 1805 the parishioners began to quarry its stone for use in its successor at Hillborough. The corporation of Trinity House intervened to preserve the twin towers as a landmark for mariners, and a protective concrete apron is now maintained around the church.

In 1540 Leland observed that Reculver was within a quarter of a mile from the sea. Granted a comparable rate of coastal recession since Roman times, the coast may then have been over a mile to the north.

22. *East of Reculver Church*, 228695

Below the end of the churchyard is part of the massive flint-built wall of a Roman coastguard station, *Regulbium*, part of which has been eroded away by the sea. A block or two of masonry still lie tumbled on the beach. It was probably built late in the third century to defend the northern entry of the Wantsum Channel against Saxon raiders. Part of its wall bounds the yard of the King Ethelbert Inn, where the landlord is willing to show Roman pottery, coins, etc., of local provenance.

23. *The North Stream Sluice*, 230695

This sluice works on an automatic tide control, necessary because the marshes are below high tide level. Natural silting was not the only factor in their reclamation. Artificial banks, including the sea wall, have been important adjuncts.²

The anomaly of a Roman coastguard station built when the shore lay a mile away to the north is of course explained by the fact that it fronted on to the Wantsum Channel, with a small harbour to the south. This is one of those rare spots where one can look out to sea over the ghosts of fields that have been tilled within our era, and also look to an erstwhile island over meadows where once Roman galleys and medieval merchantmen sailed. On this contemplative note we may conclude.

² On 1st February, 1953, the sea broke through this wall and flowed past Sarre into the Stour and back to the sea at Pegwell Bay. Thanet had temporarily resumed its island status.

FARMING IN NORTH TRØNDELAG

H. J. SAVORY*

THE two most extensive lowland regions of Norway surround the Trondheim and Oslo Fjords. Marine deposits which were laid down in both regions during the period of glacial and post-glacial submergence are responsible for a better soil cover and more continuous agriculture than in the rest of Norway.¹

Trøndelag, the region around the Trondheim Fjord, is not a single administrative unit but is divided into Nord-Trøndelag and Sør-Trøndelag, which are two of the twenty *fylker* or counties of Norway. The first, which will here be referred to as North Trøndelag, contains 45 *herreder* or rural districts and has an area of over 8,000 square miles with a population, in 1946, of 97,146. The city of Trondheim is in Sør-Trøndelag but most of the inner part of the fjord and its hinterland are in the northern county. North Trøndelag also contains the more northerly district of Namdal and a fjord region on the west coast, north of Namsos. The examples of farms which are here considered in their physical setting are taken from the central part of North Trøndelag around the northern end of the Trondheim Fjord and lie in the district known traditionally as the Innherred.

After the coastal steamer has entered the Trondheim Fjord from the outer lead, it travels south-eastwards through a transverse channel less than four miles wide. As the ship approaches Trondheim the fjord broadens and its main trend becomes north-easterly. A voyage of some 40 miles brings one to Skarn Sund (Fig. 1), a narrow channel that connects the main fjord with its inner compartment the Beitstad Fjord. Finally, the narrow Beitstad Sund leads past the small iron mining village of Malm into the Hjellebotn. The main sections of the Trondheim Fjord have a Caledonian trend and this is continued in the depression which contains lake Snaasa. The narrow connecting straits follow approximately north-south lines of weakness, repeated in some inland valleys like those of the Folla Elv and Leksdal.

On the west side of the fjord there is an almost continuous wall of hills rising to 1,800 feet, the fractured edge of outcrops of Archean

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¹ Axel Sømme, "The Physical Background of Norwegian Agriculture," *Geography*, vol. xxxv, pp. 141-154, 1950; Axel Sømme, "Norwegian Agriculture and Food Supply," *Geography*, vol. xxxv, 1950, pp. 215-227. See also the same author's *Jordbrukets geografi i Norge* (Geography of Norwegian Agriculture), text and atlas with English summary, Bergen, 1949.

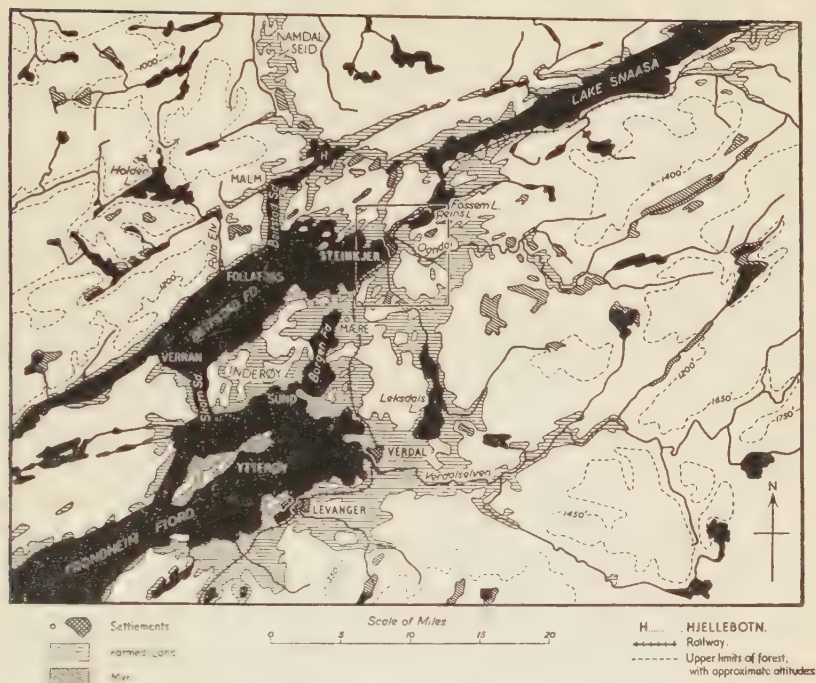


Fig. 1.—The northern part of Trondheim Fjord. There are considerable local variations in the altitude of the upper limit of forest. The area enclosed in the rectangle is that shown by the block diagram in Fig. 2.

granite and gneiss which extend to the Atlantic coast.² The fjord itself and its eastern margins lie within the less resistant zone of Cambrian and Silurian schists and limestones, a zone, which, although low lying, has a varied relief and includes many ice-moulded forested ridges and plateaux between 600 and 1,200 feet (Fig. 2). The latter are frequently composed of locally resistant rocks, such as the Algonkian rocks south of Steinkjer. From the lowlands, valleys such as Ogndal and Verdal penetrate eastwards and, 15 to 20 miles from the Trondheim Fjord, their upper reaches deeply dissect the massive 2,000-foot plateaux near the Swedish frontier.

During the last part of the Ice Age, the ice margin retreated north-eastwards across North Trøndelag. Approximately half way across the present fjord it paused and a moraine was built, which now forms the island of Tautra and probably corresponds to the Ra (Finiglacial) moraine of south-eastern Norway.³ The ice-front subsequently retreated in stages and left a series of recessional moraines between Skarn Sund and Stod on lake Snaasa.⁴ A gravel moraine belonging to

² H. W. Ahlmann, "Geomorphological Studies in Norway," *Geografiska Annaler*, Årg. 1, Stockholm, 1919, p. 193.

³ Isak Undås, "On the Late Quaternary History of Møre and Trøndelag," *Det Kgl. Norske Videnskabers Selskabs Skrifter*, No. 2, Trondheim, 1942, pp. 31-2.

⁴ Olaf Holtedahl, "Om Land-isens Bortsmelting fra strøkene ved Trondhjemsfjorden," *Norsk Geografisk Tidsskrift*, Bind II, Oslo, 1929, pp. 104-5.

this series is well seen at Steinkjer (Fig. 2) and the outskirts of the town are built on it. At that time most of the Cambro-Silurian zone, where not covered by ice, was submerged beneath the sea. As glacial drift and ground moraine were exposed, finer material from them was washed into submarine valleys where, combined with sediments carried into the sea by meltwater streams, it formed marine clays. At the same time the land was rising in level, so some glacial clays escaped the effects of sea action where the ice was slow to melt. The stages of emergence are marked by a series of shorelines,⁵ the highest of which, in the Steinkjer area, averages about 590 feet above sea level. The Tapes-Littorina marine transgression offset the rise in land level and cut a shoreline between 195 and 230 feet above sea level.^{6,7} The last phase of the renewed uplift caused the formation of raised beaches near the coast. These events are of great significance to human geography because farming is almost entirely confined to the marine sediments or the glacial clays.

The recent sedimentary cover is broader on the eastern than on the western side of the Beitstad Fjord. There are two reasons for this. Firstly, the Archean block of gneiss on the western side causes the land to rise more steeply and to a more uniform height. Secondly, the post-glacial uplift has been greater in the east than in the west. Thus the marine deposits are most extensive in the Inderøy peninsula, along the Leksdals depression, in Verdal and Ogdal and east of the Borgen Fjord, which is separated from the Trondheim Fjord by the moraine at Sund (Fig. 1). Uplift in the east has raised the sediments above the climatic limits of agriculture. In the main valleys, glacial and marine sediments have been re-sorted as river and lake terraces. Landslides frequently occur where the marine clays rest on a steep rock base.

If late glacial events have thus contributed a soil fit for cultivation, a climate abnormally mild for latitude 64°N permits crops to survive in it. The trend and extension of the Trondheim Fjord make possible the penetration of oceanic air from North Atlantic Drift waters. Nevertheless, conditions are not strictly comparable with those in more favourable westerly regions and many climatic characteristics are transitional. Autumn is rainy but the onset of the first prolonged snowfalls in November or December usually marks the beginning of a period of cold with temperatures nearer to those of Sweden than Western Norway. The figures given below seem to indicate that the shallower Beitstad Fjord exerts less influence than the main body of water. In some winters it freezes over.⁸ Winter temperatures vary a good deal from year to year. July temperatures are as high as on the west coast of Britain but there is a rapid fall in September. The mean July tempera-

⁵ Isak Undås, "On the Marine Limit of the Ra Period," *Norsk Geografisk Tidsskrift*, Bind IX, 1943, p. 33.

⁶ K. O. Bjerlykke, "Norges Kvartaergeologi," *Norges Geologiske Undersøkelse*, No. 65, 1913, p. 161.

⁷ Isak Undås, *op. cit.*, 1942.

⁸ The Germans moved artillery over the ice in the winter of 1941.



Fig. 2.—Block diagram of the Steinkjer area. The diagram represents an area of 8 miles from N. to S. by 7 miles from E. to W.

tures show a significant difference between the eastern and western margins of the fjord.

TEMPERATURE (° F.)⁹

	J.	F.	M.	A.	M.	J.	Jy.	A.	S.	O.	N.	D.	Av.
Steinkjer ..	24.6	25.0	28.4	37.8	45.7	54.5	58.3	56.1	49.1	39.6	31.6	25.5	39.7
Trondheim ..	27.3	27.9	30.6	38.3	45.9	53.6	57.2	55.4	48.9	40.5	33.1	27.7	40.5
Bergen ..	34.5	34.2	35.6	41.5	48.2	54.5	57.4	56.7	52.2	45.5	39.4	35.6	44.6
RAINFALL (inches) ¹⁰													
Steinkjer ..	2.8	2.2	2.0	1.8	2.0	2.4	3.0	3.2	3.3	3.4	3.1	3.0	32.2

Late frosts in spring,¹¹ and rain in August and September add to the risks of farming and sometimes shorten the growing season. The season for barley is from May 10th–20th to August 10th–15th and that for oats from May 5th to August 15th–20th. The first crop of hay is collected in July. Low evaporation and heavy dews necessitate drying on *hesje* (hay racks) even though the rainfall is lower than in most parts of western Norway. Artificial driers are taking the place of *hesje* on many farms. Soft fruits thrive in the long summer days but the seasons are late, e.g., strawberries are picked in mid-August. Stock are kept indoors from October to May and a basic need, the implications of which are seen far back in the past, is to produce enough fodder to feed them during the winter. North Trøndelag now produces more fodder than it needs and exports hay to other parts of the country and abroad. After 1900, imported feeding-stuffs from America had begun to change traditional systems but this source has provided little since 1939.¹²

Physical conditions make farming possible but they do not make it easy and the human effort to occupy land has been great. Since pre-historic settlements were established on the old shorelines, occupation of some areas has probably been continuous. Much colonisation took place in the early Christian era and by the 11th century A.D., when the farmers of the Innherred met at Maere, much of the farm land now utilised had already been won from the forest. Maere Church, which shares with an old farm a hill site on a gneiss outcrop, was the centre of the four inner cantons of the Trøndelag of the Sagas. The present location of large old farms at intervals on defensible hill sites is a striking feature.¹³ Most of these farms have significant names which can be found recorded in medieval land registers and in 14th and 15th century ecclesiastical land books. Many of the original farms have been

⁹ B. J. Birkeland, "Temperaturnidler 1861–1920, 60 Ar," *Norsk Geografisk Tidsskrift*, Bind II, 1928, pp. 57–8.

¹⁰ A. Helland, *Norges Land og Folk*, vol. xvii, pt. 2, Kristiana, 1909, p. 186.

¹¹ e.g., 8° of frost in early June at Maeresmyra, 1941. Recorded in A. Hovd, "Nedbor og Temperatur pa Maeresmyra 1939–45," *Melding frå det Norske Myrselskaps Forsøksstasjon pa Maeresmyra*, Lillehammer, 1948.

¹² Although there was a temporary increase in the imports of fodder after 1945 to help in the rehabilitation of the dairying industry, they never reached the levels of the 1930's and have since fallen again.

¹³ *Haug*, meaning a hillock and also a burial mound is a common old farm name. The Haug farm in Verdal is the oldest name recorded in that Rural District and is mentioned in the saga of the battle of Stiklestad, 1030 A.D. Einar Musum, *Verdalsboka*, Bind 3, Trondheim 1930–31, p. 240. For a study of the subject in general, see Magnus Olsen, *Farms and Fanes of Ancient Norway*, Oslo, 1928.

subdivided or extended, but the process of fragmentation has been checked or, in some cases, reversed since the 19th century.

The dispersed farm is the distinctive feature of the cultural landscape. Nucleated villages are rare and it is common to see a rural school half a mile or more from the nearest habitation. Steinkjer, the administrative centre of North Trøndelag and the only town on the Beitstad Fjord, had, in 1946, a population of 2,808, which was 1,230 more than that of its nearest rival, Levanger. Steinkjer was heavily bombed during the 1939-1945 war but has now been rebuilt, its centre in brick and concrete, its residential areas in wood. The social and commercial services provided by these small towns serve the needs of farmers from a wide area. They possess many features such as bookshops, high schools, hotels and banks, which would not be found in an English town of corresponding size.

Most farms on the east side of the Beitstad Fjord have an agricultural area of less than 50 acres, but a forest area of two to four times that amount. Apart from smallholdings of less than half an acre, most farms tend to fall into two groups, from five to ten acres or from twenty-five to fifty acres of agricultural land, excluding forest. The first group is likely to consist of family farms where ten acres is a good holding. The larger farms need to employ labour and may be mechanised. Labour is difficult to obtain, especially as much of it is seasonal and as the growing season is short. This is partly responsible for the postwar tendency on larger farms to move from dairy farming to grain production, for the latter can be more easily mechanised. Most farms are mixed farms. The rural districts of Verran and Malm on the west side of the Beitstad Fjord have a much greater proportion of smallholdings than those on the east side. On parts of the coast, where smallholdings prevail, farming may be combined with fishing; but on most farms, and especially the larger ones, the main supplementary activity is forestry. Lumbering is an insurance against fluctuating agricultural prices and also supplies building material for the farm, so the balance between farm and forest land may, within certain limits, be determined by economic conditions. In North Trøndelag, private farms own 55% of the productive woods, compared with 25% owned by companies and 15% by the state. All cutting is, however, under state control and conservation is safeguarded.

The least useful types of land are the *myr* and *fjell*. *Myr*, or peat bog, usually occupies rock basins, former lakes and the worst drained parts of terraces. In older times the margins of the *myr* were used as summer pastures and the *seters* were located near them or in the forest clearings. The *seter* of North Trøndelag thus resembles the *fabod* of Sweden¹⁴ and not the mountain *seter* of western Norway. Clearings are not numerous and *seters* always played a smaller part in the scheme

¹⁴ For a description of the Swedish *fabod* see K. C. Edwards, "Note on Transhumance: Sweden," *Geography*, vol. xxvii, 1942, pp. 67-8, and *Sweden: Dalarna Studies*, Le Play Society, 1940.

of agriculture than in western Norway. Verdal rural district had 160 *seters* in 1907,¹⁵ but had a negligible area of *seter* clearings according to the agricultural census of 1949.¹⁶ Their decline may be associated with the replacement of subsistence agriculture by commercial dairy farming. Under the first system, cattle for meat could be pastured at the *seter* in summer, but dairy herds need more intensive feeding than the *seter* pastures provide, otherwise their milk yield suffers. Some of the former *seter* huts are now used to accommodate winter and summer visitors from Trondheim and the smaller towns.

Farmers also have turbary rights on the *myr*. In some areas drainage schemes have made it fit for cultivation. A large area at Maere has been reclaimed by the Norwegian Bog Reclamation Society. A larger area could be reclaimed but such schemes are mostly beyond the resources of ordinary farmers. Few hill summits in the Cambro-Silurian zone rise above the forest line, so *fjell* pastures are unimportant. *Fjell seters* can be found near the Swedish frontier at high levels, and in the west where the forest line is lower.

It is not possible here to analyse the farm sites in detail, but Fig. 2 indicates the kinds of site which are frequent. Farms are usually on high ground, on the edge of a terrace or near a quaternary shoreline where marine deposits permanently or temporarily disappear. Some are on isolated rock outcrops and some on moraines. The farm buildings are frequently at the upper limit of agricultural land near the edge of the forest. On this illustration, A is a large mechanised farm in such a position, on the southward facing slope of a valley filled with marine clays. This farm has a large area of forest, but concentrates on grain production. B is well situated on a recessional moraine in a sunny location and on fairly light soils. A greater acreage of orchards and soft fruits is possible. There are more sheep than cows, partly because of a forest area of over 750 acres, in which sheep are grazed in summer and partly because of the demand from the nearby factory of Byafossen for wool. Much timber is also cut and floated to Lake Reins where there is a woodpulp factory. C is on a raised beach and has an unusually high proportion of flat land. It has little forest and concentrates on growing grain and root crops. There are a few small hill farms but these are not shown on the diagram since they are found mostly in the high land further east. They usually have about ten acres of farmland, three or four cows with much dependence on hay; silver foxes provide a secondary source of income.

The following study has been made of Brekken, which may be considered typical of the larger farms found within about ten miles of the east coast of Beitstad Fjord.

Brekken is about five miles southwest of Steinkjer (Fig. 1) and just over a mile from the sea. The farm area is elongated with its lower boundary along a stream and its upper boundary in the forest.

¹⁵ A. Helland, *op. cit.*, vol. xvii, pt. 2, p. 275.

¹⁶ *Jordbruksstillingen i Norge* (20 Juni 1949), Oslo, 1950, p. 100.

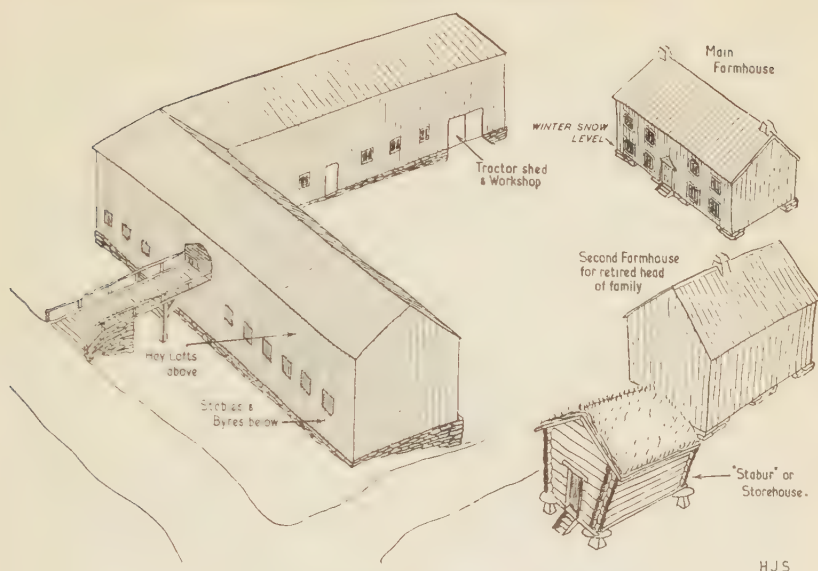


Fig. 3.—A North Trøndelag farmstead.

The homestead lies near outcrops of gneiss at a change of gradient which probably represents an old shoreline. Forest extends on the higher land above the shoreline interrupted only by *myr*. The whole area of the farm lies below the upper marine limit and superficial deposits occur in the forested portion, but are deepest under the agricultural land.

The name of Brekken, meaning "the hill," first appeared in records in 1650, but its land was probably colonised in the ninth century. The original farm was not subdivided and two farms were added to it in the nineteenth century. One of these former small-holdings is detached from the main farm and a small distance from it. It is not unusual for farms to be divided in this way, either from subdivision or concentration of holdings and one farm in Verdal has an "outlier" two miles from the main farm on the opposite side of the river. Formerly twelve *husmen* worked at Brekken in return for the renting of small cottages and small plots. The cottages have now disappeared and the last *husmen* finished work thirty years ago.

Of the 250 acres of land on the farm, 100 are agricultural and the remainder forest. The 100 acres include 25 acres of barley, 15 acres of permanent pasture, $7\frac{1}{2}$ acres of oats, 5 acres of spring wheat, 5 acres of potatoes and 4 acres of turnips. Nearly all the remainder is cultivated hay and pasture from which high yields of grass are obtained by fertilisation. Crops are grown on a six-year rotation, three years of grass (80% for hay, 20% for silage) followed by one year of root crops, then two years of cereals. The first crop of grass goes to hay, which was formerly dried on *hesje* over a period of two weeks, but at Brekken the farmer has recently installed an artificial drier. Subsequent crops of hay are used for silage. The yield of hay is approximately fifty cwt.

per acre, of potatoes two hundred and fifty cwts. per acre and of grain twenty-five cwts. per acre.

To obtain these yields the land has to be well treated with fertilizers (about 5 cwts. per acre), in addition to the farmyard manure which is plentiful on mixed farms.

Barley remains the staple grain crop in this area, as it has always been. Spring wheat cultivation was encouraged during the 1939-45 war and has been successful, except during some summers when the wheat was cut late and the quality suffered. Potato cultivation also increased during the war, though this involves a problem of seasonal labour in a relatively sparsely populated area. School holidays are partly timed with agricultural needs in mind and some high schools have a break during the potato-lifting season in September.

Brekken has a herd of 45 cattle, mainly the Red Trønder breed, but including also six Spotted Trønder which are fattened for slaughter in December, the traditional month for killing stock. The meat is stored in the *stabur* (Fig. 3). The Spotted Trønder are the indigenous breed and are now most common in the north of Trøndelag, especially in Snaasa, Namdal and the mountain districts near to the Swedish frontier. The Red Trønder are a cross between Spotted Trønder and Ayrshire, initiated in 1886 and fixed by 1890, since when no Ayrshire have been imported. The Red Trønder now number about three-quarters of the cattle of North Trøndelag and have a higher milk yield than the native breed. The cattle are kept in the byre for eight months of the year and their milk yield is higher during this season. Milk is sold through the co-operative dairy at Sparbu. The farmer also has 15 sheep. These are of a large breed kept mainly for mutton and they graze in the forest from May to October.

There is one tractor on the farm and six labourers are employed. When I visited the farm in December 1950 a sawmill was being built. This was during the slack season after the autumn rush and before the lumbering season in January. On the shortest day the sun rises at 9.50 a.m. and sets at 2.10 p.m.

The layout of the farm resembles that of a farm in similar latitudes in Sweden. The buildings are grouped around a quadrangle (Fig. 3). The upper floors are hay lofts in which hay is stacked from carts which enter the building. The gradient of the site is sometimes used to provide the direct entrance to both lower and upper floors. On the ground floors are the byres, stables and workshops. The traditional farm is built with three layers of walls, the innermost of solid beams. The *stabur* is a well-built log hut with a turf roof from which small trees may sometimes be seen growing. It is the storehouse for grain and meat. Nearly all farms of this kind are supplied with electricity either from the Follafooss power station or from their own generators.

The use of land at Brekken may be compared with that in the administrative areas illustrated in Fig. 4. The five Rural Districts represented by A are east of the Beitstad and Borgen Fjords and contain some of the best populated agricultural areas. Even so, the pro-

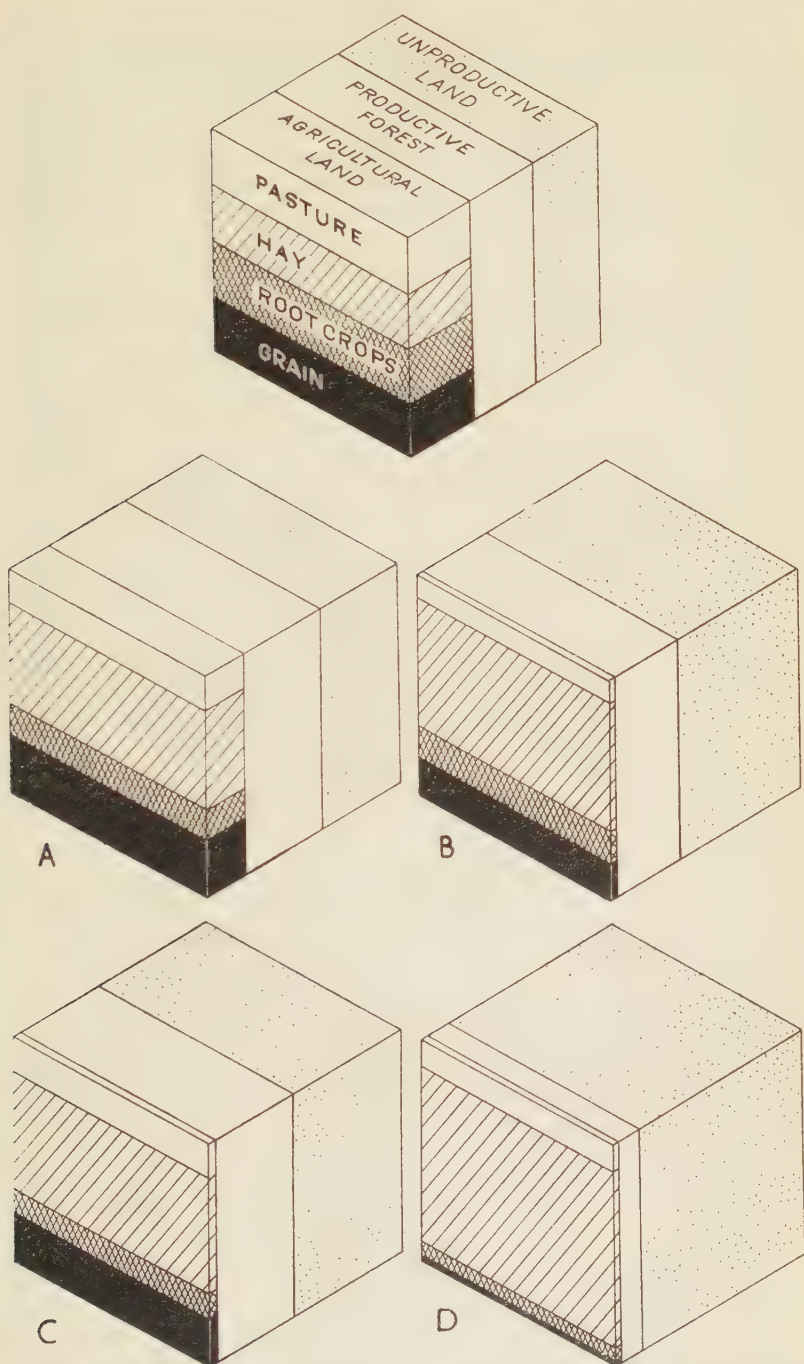


Fig. 4.—Isometric diagrams of land use in North Trøndelag (A, B, C) and western Norway (D). For identification of A, B, C, and D, see note on p.282.

portion of land classified as unproductive amounts to 40%. This may include some unproductive forest as well as *myr* and *fjell*. (The 150 acres of forest on Brekken farm are not all productive and include some land which would come within this classification.) The Rural Districts on the west side of the fjord (B) have a percentage of agricultural land nearer to that of North Trøndelag as a whole (C) and much lower than that of A. All of the North Trøndelag districts (A, B and C) have a higher proportion of productive forest and a greater percentage of their agricultural land devoted to grain than has the *fylke* selected from western Norway for comparison (D).

Although the population of North Trøndelag is sparse and scattered, only 4 of its 45 Rural Districts showed a decrease in population from 1930 to 1946. The towns have not had a disproportionate increase compared with the countryside. The farms are not as culturally isolated as their dispersed distribution may suggest. The well-stocked bookshops of Steinkjer supply Norwegian and English novels to customers from rural areas. Original painting by local artists is preferred to mass-produced prints and it has been possible to form a symphony orchestra drawing some of its members from as far as 100 miles. The social causes and consequences of rural depopulation appear not to have arisen. Local pride in the standards of farming and in the status and well-documented histories of the farms themselves contribute to social stability. Yet, depopulation has occurred in the past and there is local consciousness that the present stability depends on a balance which could be disturbed. The agencies that favour farmers' interests prefer the Folk High Schools and the Agricultural Colleges to those which prepare students for university and administrative careers, since they feel that the latter may help to increase the social pull away from rural areas.

Note :—The letters in Fig 4, refer to the following areas :

A.—A group of Rural Districts (*Herreder*) on the N.E. side of the Trondheim fjord—Egge, Inderøy, Røra, Sandvollan and Sparbu.

B.—The Rural Districts of Verran and Malm on the N.W. side of the fjord.

C.—The total area of N. Trøndelag.

D.—Sogn og Fjordane, a typical western Norwegian *fylke* comparable in size with N. Trøndelag.

The figures are based on the Agricultural Census of 1949 (*Jordbrukstellingen i Norge*, 20 Juni 1949, Oslo, 1950, Tables 2, 6 and 8).

THE LE PLAY SOCIETY

President : SIR E. JOHN RUSSELL, O.B.E., D.Sc., F.R.S.

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Switzerland (in huts) (Geology and Geography)

Full details from : Miss Margaret Tatton, at the Society's temporary address : The Birlings, Birling Gap, Nr. Eastbourne.

CAREERS FOR GEOGRAPHERS*

THE Royal Geographical Society frequently receives requests from parents, university students, heads of schools, and employers for information regarding careers open to those who have followed a university course in geography. The Education Committee of the Society was asked to consider the matter and this Memorandum is the result. It first sets out to describe the characteristic attitude of mind and outlook which results from a training in geography and shows how these are invaluable in a wide range of occupations for which clear thinking, broadmindedness and a wide human outlook are the chief requisites. It then goes on to examine some careers for which the geographical training and knowledge acquired during the university course are of prime importance. An appendix is added to give further details of certain careers.

As an educational instrument, geography clearly takes its place among those studies whose virtue lies in the intellectual discipline and cultural training they afford. Unlike law, medicine or engineering, it does not often lead directly to a specific profession, but like history or ancient classics it is particularly useful in broadening the mind and in producing habits of viewing problems in their all-round relations and not from any one specialist standpoint. It is however unique in its transitional position between the natural sciences and humanistic studies, a position which enables it to induce in its students critical and literary skill combined with discipline and accuracy of thought. The trained geographer is accustomed to approach a problem from all possible directions, just as he is accustomed to analyse a landscape from the point of view of many diverse branches of knowledge. He is able to balance the factors of a problem and see it as a whole, just as he is able to synthesise the elements of a landscape and see it in its unity. He develops the particular intellectual skill induced by the habit of seeking correlations of varied and apparently disconnected phenomena and of drawing together the data of natural and social investigation into a synthetic whole. It is this habit and intellectual skill that are the fundamental assets of the geographer. He takes a synoptic and philosophical view of the world and has a by no means negligible acquaintance with some of the studies cognate with geography, viz., geology, biology, mathematics, physics, climatology, statistics, history, social anthropology and economics. A well-trained geographer should therefore be regarded as a person of high education specially fitted for posts that demand a wide, human outlook. This should be more widely known among employers than appears to be the case.

It remains true however that in many fields greater importance is attached to character and personality than to the degree subject. This is as it should be; but the educational value of geography in fitting a man or woman for a responsible position should be fully recognised.

It follows from what has been said above that the geographer may

* This memorandum was prepared for the Council of the Royal Geographical Society in September 1949 by a committee consisting of Dr. E. D. Laborde, Professor W. Gordon East, Dr. Alice Garnett and Dr. E. W. H. Briault. It has recently been revised by the same committee under the chairmanship of Dr. Briault, and with the co-operation of the Executive Committee of the Geographical Association and Professor K. C. Edwards on behalf of the Conference of Heads of University Departments of Geography. It is reprinted here by the kind permission of the Council of the Royal Geographical Society.

properly look for a career in public administration, in industrial and commercial management, in politics, transport, journalism, the Fighting Services, banking and insurance.

In public administration the value of a geographical training is recognised in the administrative grade of the Civil Service. This training is so eminently suitable for candidates for posts in the diplomatic and consular services, in the Foreign Office itself, and in town and country planning that it is surprising that it is not a compulsory qualification. It is also an asset in the Colonial Administrative Service but not a qualification. Transport organisations, especially those dealing with shipping and aircraft, provide suitable work for geographers in such posts as traffic managers on long distance services. In journalism, foreign correspondents, special correspondents, and leader writers would benefit by a deeper knowledge of geography than many of them now possess, as would the politician who intends to take a special interest in Commonwealth or foreign relations. It is clear that neither the journalist nor the politician can correctly think out problems connected with countries whose general background he does not know. And such knowledge cannot be picked up in a moment. The use of geography to the sailor, soldier and airman is too obvious to require emphasis.

A training in geography, or at least in some of its field, does lead directly, however, to certain careers. Important among these are colonial administration, participation in group research investigations into colonial problems of many kinds, and surveying, in particular colonial survey, which is now expanding and offering well-paid posts. Teaching affords a very large number of places for geographers, not only in schools (where the study continues to grow in favour), but also in universities at home and in the Commonwealth, most of which have geographical departments under one or more professors.

APPENDIX

Some details of particular openings.¹

A. Business and Commerce. An increasing number of business and commercial posts are being filled, in which a knowledge of geography is particularly useful. Such posts vary greatly in character, but altogether they represent a steadily expanding use of the geographer's services. They include managerial traineeships, secretaryships in business firms, posts in buyers', freight dispatch, and export departments of large firms, and in market research, and various posts at home and abroad in trading concerns dealing with particular commodities, to say nothing of the Mercantile Marine. Increasingly, posts are obtained in connection with the editing and production of books, periodicals, maps and educational films and film strips where an expert knowledge of geography is required, while occasionally graduates in geography are employed in various branches of journalism. It is highly desirable that the usefulness in business and commerce of men and women with degrees in geography (especially if geography is combined with economics) should be more widely recognised. It is not merely that their particular study is broadly relevant to economic activities at home and abroad, but also that their special training equips them to grapple effectively with fresh problems.

B. Government Service. During and since the war, graduates in geography have been appointed to posts in various branches of the Civil Service at home and abroad. In the Home Civil Service (Administrative), geography has an equal status with other subjects, in so far as it is now

¹ Inquiries regarding the various appointments mentioned in this Memorandum should be addressed directly to the responsible authorities.

possible for candidates who offer geography to obtain all their marks for optional subjects in geography alone. Openings in the Civil Service by open competition appropriate to graduates in geography may be summarised as follows:

- (a) Home Civil Service (Administrative).
- (b) " " " (Special Departments, including technical posts).
- (c) " " " (Executive).
- (d) Foreign Service (With oral examination in a modern language).
- (e) " " (Branch B, which includes posts of an executive nature).
- (f) " " (Government Communications Headquarters, specialised posts).

Among the specialised posts offered by government departments from time to time for which the trained geographer is particularly suited and is normally considered are the following:

(i) Research posts in the town and country planning side of the Ministry of Housing and Local Government and the Department of Health for Scotland. Both of these Departments employ graduates in geography, together with economists, geologists, etc., in research grades, although some of the posts in the lower grades are temporary at present. Only graduates with First and Second Class Honours degrees are considered.

(ii) Other Government Departments, notably the Ministry of Defence, the Board of Trade, and the Ministry of Agriculture and Fisheries employ geographers for research work. For posts in the last-named Ministry, some experience of field work on country planning and a knowledge of agricultural and rural conditions are required.

(iii) Posts under the Nature Conservancy and the National Parks Commission are offered from time to time to highly qualified graduates in geography.

(iv) Graduates in geography with good Honours degrees and preferably with subsidiary mathematics or languages are used also as civil hydrographic officers by the Hydrographic Department of the Admiralty. Vacancies occur from time to time.

(v) Colonial Survey. There are at present a number of vacancies for surveyors. Apart from surveying qualifications, a degree in geography is a good preparation for the Colonial Survey training course, but either subsidiary mathematics or physics is essential. Graduates in geography without a training in survey may undertake a twelve months' course to enable them to qualify for appointment, the training being undergone at either University College, London, or the Survey Training Centre, Newbury. It seems likely that openings with the Colonial Survey will continue to exist for many years to come for men with the required standard of education, character and physical fitness.

(vi) There are occasional openings in the map libraries of the Directorate of Military Survey and the Directorate of Colonial Surveys.

(vii) There are posts, at present temporary, under the Colonial Office for geographers as members of teams concerned with economic and social development surveys, soil erosion, water resources, etc., in colonial territories. Vacancies also occur in the colonial meteorological service, for which suitably qualified geographers may compete.

(viii) A few geographers have found employment with the Joint Intelligence Bureau, the British Council, the Imperial Plant Bureau, the Soil Survey of Great Britain, and River Boards.

C. *Planning.* Some recognition has already been given to the geographer in this field. By reason of his training, he has clearly an important contribution, no less than that of the architect, the economist, and the civil engineer, to make to the planning work undertaken by the Ministry of

Housing and Local Government and by Local Planning Authorities (Counties and County Boroughs). Openings for geographers in the former have been mentioned above (see B (i)). The Local Planning Authorities occasionally employ geographers in specialised posts concerned both with research and survey and in general planning work. The latter posts are however mainly filled by architects, engineers or surveyors who are also members of the Town Planning Institute, and geographers in these general grades are normally expected to become members in due course by passing the Institute's Examination. It has recently been decided that candidates with approved degrees in geography should be admitted direct to the final examination of the Town Planning Institute. Successful candidates in this examination are qualified for Associate Membership, subject to satisfying the Council as to their practical town planning experience.

D. *Teaching.* Like other specialist graduates, the graduate in geography is usually qualified to teach his subject either in universities or schools according to his aptitude, ability and standard of proficiency. A large proportion of geography graduates now take up teaching; the proportion is markedly less at Oxford and Cambridge than at other universities. The great majority of schools now recognise that geography is an essential part of a good education. In the General Certificate of Education, Ordinary level, the numbers offering geography have steadily increased until they are now greater than those offering all but three or four other subjects.

THE SECOND INTERNATIONAL CONFERENCE OF TEACHERS OF GEOGRAPHY

BAARN, NETHERLANDS, 23rd to 28th August, 1954

MARGUERITA OUGHTON

AT Sheffield in August 1951, the First International Conference of Teachers of Geography ended on a constructive note by approving proposals for an International Union of Geographical Associations. The reality of the Union was confirmed when the *Geografische Vereniging in Nederland* invited member-associations to the Second International Conference which the Dutch Association proposed to organise at Baarn, near Hilversum in August 1954. At the opening of the Conference on August 23rd at Utrecht, 159 members and delegates, representing 16 countries,¹ had gathered to participate in a meeting which proved a worthy successor to the first Conference. The countries most strongly represented were France, Germany, Great Britain, Italy and the Netherlands. Mr. L. S. Suggate officially represented the Geographical Association, and Professor L. Dudley Stamp, President of the International Geographical Union, was also present. Twenty-one members of the Geographical Association travelled to the Conference as a party; other members who

1. Belgium, Canada, Denmark, Egypt, Eire, France, Great Britain and Northern Ireland, Germany, Italy, Netherlands, Nigeria, Sierra Leone, Southern Rhodesia, Sweden, Switzerland, and Trinidad. Pakistan's representative, Professor Chatterjee of Calcutta, was not able to attend; nor, regrettably, were the United States of America represented.

arrived independently increased the British group to 35. The proceedings of the Conference fell into two parts: excursions, preceded by lectures, to visit different regions of the Netherlands and important University and government departments; and lectures and discussions on aspects of the teaching of geography.

The Conference was declared open by Her Excellency Dr. A. de Waal, Secretary of State for Education, Arts and Sciences, herself a geographer and formerly a lecturer at the University of Utrecht. Miss de Waal, welcoming the foreign visitors, spoke of the importance of geographical understanding in improving international relations and in the solution of social problems, and of the value to teachers of the opportunities for exchanging ideas at international meetings. Cordial greetings delivered to the Conference by Professor A. C. de Voofs, on behalf of the *Koninklijk Nederlandsch Aardrijkskundig Genootschap*, and by Professor Stamp, from the International Geographical Union, were followed by short addresses by delegates from several Associations: Professor J. Wagner (Frankfurt) of the *Verband Deutscher Schulgeographien*; Professor A. Meynier (Rennes) of the *Société des Professeurs d'Histoire et de Géographie de l'Enseignement Public*; Mr. Suggate of the Geographical Association; and M. Spitaels of the *Fédération Belge des géographes Professeurs*. Dr. W. Jong, Chairman of the Conference, welcomed the visitors on behalf of his colleagues in the *Geografische Vereniging*, and undertook the arduous task of translating oral proceedings into English, French or German, throughout the Conference; he welcomed a delegation of Italian geographers, newcomers to the Union.

In the lectures which prefaced the longer excursions, the strong relationship between regional physical and social survey research, intensive physical field surveys and Netherlands state planning was illustrated by Dr. A. J. Wiggers (Drainage and reclamation in the former Zuiderzee), Dr. A. J. Venstra (Colonisation of the new polders in the IJssel Lake) and Dr. F. W. G. Pijls (The horticulture of the Westland). The subsequent excursions to the Northeast Polder of the Zuiderzee and to the Westland (the "glasshouse" district lying west of Delft and Rotterdam) revealed to the foreign visitors man-made landscapes, both physical and cultural, and intricate patterns of land use and social geography of very great interest. Not least did the travellers appreciate the "proving" of the products of the Westland, fresh samples of grapes in the glasshouse of an experimental agricultural station. Visits were also arranged according to individual interest to the Topographical Institute (Ordnance Survey) and to the well known Hydrological Laboratory at Delft, to the Town Planning Institute of Rotterdam and to the Museum of the Royal Institute of the Tropics, Amsterdam and the Institute of Physical Geography of the University of Amsterdam. A short excursion was made to the push-moraine ridges of the Gooi, the district north of Hilversum, and to former fishing villages on the southern shore of the Zuiderzee (now the freshwater IJsselmeer). The route of this outing led back through Hilversum where the party visited the Town Hall, which was designed by Dudok in 1928. On the last full day of the Conference, in warm, sunny weather, all the members made a specially conducted tour by water, of the canals and the harbours of Amsterdam; this most instructive and pleasurable excursion was arranged for the Conference by the Municipality of Amsterdam and the Port Authority, a very generous civic gesture.

The understanding of the lectures was greatly facilitated by the

distribution of summaries appropriately in English, French or German, while the discussions which followed lectures were carried on in language groups, the group secretaries reporting their findings to the re-assembled meeting later. In his lecture on the teaching of the geography of under-developed countries, Professor Stamp was concerned about misconceptions which might arise from the use of the words "under-developed, backward or undeveloped," and the undesirable derogatory connotations which these words may have for children in various parts of the World. He asked for the imaginative but accurate use of statistics in the economic geography which would form such a large part of this study, which he suggested should not stress individual countries, but which should develop naturally in a course of world regional geography. In later discussion, members suggested that the human geography aspect of a potentially arid economic study should not be forgotten; that inter-comparable statistics were not usually accessible, although the United Nations publications have done much to meet this need; and that methods of teaching, adopting the approach offered by Professor Stamp, must remain very flexible, especially with younger children.

Two papers of much interest particularly to foreign geographers were given by Professor J. P. Bakker, of the Institute of Physical Geography at the University of Amsterdam, and Professor A. C. de Vooy, of the Department of Human Geography of the University of Utrecht. Both spoke on university study of geography in the Netherlands, and their very contrasted views showed the real, almost extreme, distinction between physical and social geography in Dutch universities, whose courses are intended to train specialists capable of carrying out independent research; a similar training is demanded of the fully qualified teacher. Such courses demand a long period of study (5 to 7 years) and special work in related sciences. These characteristics were illustrated by the type of research carried on in the various departments, whether it is the highly specialised physical and chemical soil analysis, at the laboratories of the Amsterdam department, or the highly developed surveys of social problems at Utrecht.

A lecture which provoked very great interest and exchange of views was given by Dr. H. Knübel (Wuppertal) on fieldwork by secondary school pupils. From his account, it is evident that, in Western Germany, fieldwork and excursions can be arranged under conditions similar to those which exist in Great Britain, given the enthusiasm and ability of the geography teacher and the co-operation of the school headmaster. Dr. Knübel mentioned the *Landschulheim* (School Country Home) belonging to the school, or the Youth Hostels, as places from which forms may make local surveys during a week's stay. Discussion on the subject revealed that German and British teachers are perhaps more fortunate in the facilities they have for fieldwork than many of their colleagues in other countries. Attention was drawn to the provision of accommodation for fieldwork in Britain by such organisations as the Council for the Promotion of Field Studies and the Scottish Council for Physical Recreation. It was suggested that teachers and national geographical associations might consider the preparation of maps and lists of suitable areas of work within reach of schools in given areas to help teachers with less training in undertaking fieldwork. The exchange of results and methods individually between teachers and schools at an international level was offered as a stimulus and encouragement for teachers specially interested in this aspect of teaching geography. On behalf of the French speaking group (which

included French, Belgian, Swiss and Italian delegates), the Belgian delegation moved that the Conference should vote on recommendations expressing the desirability of facilities for fieldwork in the teaching of geography. The text of these recommendations having been prepared in English, French and German, this motion was put to the full meeting at a later assembly, and the proposal was accepted unanimously with the rider that the foreign secretaries of geographical associations should refer the recommendations to their national committees and thereafter, as may seem desirable, to their Ministries of Education or other responsible bodies. The recommendations read :

The Second International Conference of Teachers of Geography, Baarn (Netherlands), 23rd to 28th August 1954, holds that :

1. all syllabuses in secondary schools should allow time for the inclusion of fieldwork ;
2. regulations in individual schools should be flexible enough to allow the organisation of fieldwork in a less restricted way than at present ;
3. school grants should make allowance for subventions to aid the organisation of fieldwork, and that it should be accepted that pupils may be expected to contribute towards the expense of fieldwork ;
4. the preparation by teachers should be done as far as possible in normal school time, and that fieldwork itself should be carried out during normal school periods or school terms (French text : " soient considérés comme heures de service normal ").

In his lecture on the penetration of recent trends in geography in the teaching of the subject, Dr. W. Jong (Netherlands) spoke of the efforts the geography teacher must make continuously to keep abreast of recent developments, to revise his factual equipment and to learn of new theories and developments within geographical scientific study and research. The greatest difficulty, he felt, arises when the whole body of theories on a major subject has undergone profound changes, as in the case of meteorology and climatology. " Thinking in air mass is not so easy for those who have not been brought up in the sphere of modern weather science." In geography teaching, as in other sciences, it will have to be accepted that both the old and the new approaches must co-exist for a long period until the new trends are established by newly trained teachers and by older teachers who trouble to refresh their minds and their methods.

At a business meeting of the International Union of Associations of Teachers of Geography, Dr. Jong, as foreign secretary of the host Association, took the Chair. The International Union was declared fully established and minor revisions were made in the original constitution, aptly described by Professor Stamp as " our Charter." The Associations of the following countries have adhered to the Union : Belgium, Denmark, France, Germany, Great Britain, Italy, Netherlands, Sweden and Switzerland, the adhesion of France and Italy still being subject at the time of the meeting to approval at their annual conferences. The Union accepted the suggestion of the Geographical Association that the correspondence headquarters for the Union's work should be for the time being at the Association's headquarters at Sheffield. It was recommended that the next Conference should not take place in the same year as the International Geographical Union Congress ; no definite invitation for the Third Conference could yet be offered by the representatives present at the meeting.

Other features of the Conference were a group of films complementary to the excursions and lectures ; an exhibition of wall maps, atlases and

textbooks, mainly in Dutch, but with several books on the Netherlands in English, French and German ; and, on the last evening, a very happy social evening for which the delegates assembled in the ball-room of a Hilversum restaurant. In honour of the Conference the Geografische Vereniging devoted a whole issue of its journal, *Geografisch Tijdschrift* (August 1954) to papers relating to the geography of the Netherlands and the work of geographers in State survey and planning ; published entirely in English, copies were distributed to every member of the Conference. The contents of this periodical and titles of geographical interest are appended to this report.

At the end of the Conference many delegates were heard to say that they would like to stay a little longer in Holland. This sentiment expresses the degree of interest in an unfamiliar landscape (which does not always attract the visitor from a more diverse countryside) aroused by the excursions and lectures of the previous days ; but not less by the friendly hospitality of the Dutch hosts, the members of the Geografische Vereniging who mingled freely with the foreign geographers and who were ever well informed and ready to offer explanations or to enter discussion. The debt to Dr. Jong for his linguistic virtuosity has already been mentioned ; his chairmanship, shared with Mr. R. Schrader, must also be acknowledged. To the Secretary of the Conference committee, Professor de Vooys, and through him to the committee itself, sincere thanks must be offered for the excellent arrangements which were made and for the smooth progress of the whole meeting. The help of the Assistant Secretary, Miss J. T. M. van Os, was indispensable throughout the meetings in supplying the necessary summary translations and in many other ways.

It was indeed a pleasure to renew friendships which started at the first Conference and to enjoy fruitful discussion on so many aspects of geography teaching. One looks forward to another opportunity to strengthen international friendships and to exchange new ideas. It is hoped that the promises of many individual exchanges of visits, information and views will be fulfilled, giving life to the International Union both amongst geography teachers and amongst their Associations.

Publications on the Netherlands recently added to the Association's library and available on loan to members :

Geografisch Tijdschrift, vol. 7. August, 1954 : Dutch Polder country ; salt infiltration in W. Netherlands and the closing of the estuaries ; soil survey in the Netherlands and geography ; location of industry in the Netherlands ; social science in town and country planning ; the work of the geographer in institutes for social research in the provinces ; bibliography of recent literature on the Netherlands.

The Netherlands. B. G. L. M. Tosseram. Association "Nederland in den Vreemde." Amsterdam, 1953. 32 pp.

Economic Reconstruction in the Netherlands. Information Dept., Ministry of Economic Affairs. The Hague, 1952. 80 pp.

Road to Recovery. The Marshall Plan, its importance for the Netherlands and European Co-operation. Ministry of Foreign Affairs. The Hague, 1954. 212 pp.

Education in the Netherlands. P. J. Idenburg. Neth. Govt. Information Service. The Hague, 1954. 108 pp.

From Fisherman's Paradise To Farmer's Pride. The reclaiming and settling of the Zuiderzee land. Ministry of Transport and Waterstaat. The Hague, 1953. 90 pp.

Land below Sea Level. J. van Veen. The Hague, 1953. 32 pp.

De Noordoostpolder in Beeld. Directie van de Wieringermeer (Noordoostpolderwerken) Zwolle, 1953. 112 pp., map and illustrations.

La Mise en Valeur des Polders du Zuiderzee aux Pays-Bas. Directie van de Wieringermeer. Zwolle, 1954. 28 pp., maps and illustrations.

Amsterdam. Facts, figures, photographs. Municipality of Amsterdam. 1953.

OBITUARY

DR. O. J. R. HOWARTH, O.B.E.

The death of Dr. Howarth on 22nd June last deprived our Association of one of its oldest friends and wisest counsellors, and our subject of a thoughtful mind of great distinction. He will be known to a great number of our members only by his presence at recent spring conferences and by his year as our President (1953). In that office he displayed at our Annual Conference and at the Spring Conference at Lincoln a charm of manner and a breadth of knowledge and sympathy that will long be remembered, while his wise and firm but tactful handling of our affairs in committee can only be described as masterly. For all this our whole Association remembers him with gratitude, but a few will also know that as geographers our indebtedness to him goes much further and much deeper than this.

Osbert John Radcliffe Howarth was born in 1877 and educated at Westminster and Christ Church, Oxford. After graduating in history he entered the School of Geography and came under the influence of what he himself called that "exceedingly powerful combination" Mackinder, Herbertson and Dickson. He was one of the early diplomates (1902). From 1904 to 1911 he was geographical assistant to the editor of the *Encyclopaedia Britannica*, but before this work was complete he began, in 1909, that long connection with the British Association which lasted even beyond his retirement from the General Secretaryship in 1946. For not only did he serve as Curator of Down House which the Association maintained till 1953 as a memorial to Charles Darwin, but in 1951 he presided over Section E in the year of its centenary, and in his Presidential address made a distinguished and illuminating survey of its hundred years of activity. For some 37 years he guided the affairs of the British Association with a statesmanlike hand and the Honorary Doctorate awarded him by the University of Leeds in 1927 was indeed well deserved. Yet though he was absorbed in administration and the needs of British Science at large, Howarth never ceased to be a geographer. In 1914 the six volumes of the *Oxford Survey of the British Empire* appeared under the joint editorship of A. J. Herbertson and O. J. R. Howarth, and in a way they may fairly be regarded as the high water mark of the compilative and collaborative method in British geography. With the death of Professor and Mrs. Herbertson in 1916 Howarth was asked to undertake the editorship of the very numerous series of Oxford Geographies. He himself contributed useful volumes on *The Commercial Geography of the World*, *The World and Australia*, *The Mediterranean*, and *Ireland*—the last remaining to this day a very readable and useful book and the most satisfactory account of its kind available. Teachers of geography will note with interest that he collaborated with R. N. Rudmose Brown and J. McFarlane in a small book on *The Scope of School Geography* and will see the relevance of this to the "Survey of the Present Position of Geography in Schools" which he contributed to our Diamond Jubilee issue. Two other facets of his interests which were at once geographical and general should be noted. One was his continuing interest in the history of ideas. This was early shown by his collaboration with J. Scott Keltie in *The History of Geography* (1913), and widened in his volume *The British Association: A Retrospect* (1922) of which a new edition was issued in the centenary year of the Association (1931): it culminated in his book *The*

Making of Geography with R. E. Dickinson (1933) and his 1951 Presidential address. The second was his abiding love of the natural scene and was well expressed in his *Scenic Heritage of England and Wales* published in 1937 for the C.P.R.E.

Standing as he did a little aside from the task of advancing geography either by original research in its specialisms or by teaching the subject in schools, Howarth retained to the full his interest in it and added an objectivity of view that came from his association with an understanding of the work of the other sciences. We may, I think, feel proud that after this long association he returned to our subject in his years of retirement and gave so fully to our Association. And we may be glad that we honoured our Association by inviting him to be its President. Professor Fleure has spoken of Dr. Howarth as a kindly and sympathetic colleague who could combine serious thought and good-natured humour in ideal proportions. For my part I recall him as one who had once appeared to me as an elevated and rather formidable personage in the world of science, but later became a cherished friend and adviser. Such he also was to the Association as a whole.

DAVID L. LINTON

CORRESPONDENCE

THE COMMONWEALTH IN THE GEOGRAPHY SYLLABUS

In the January issue, the late Dr. Howarth's Presidential Address contained these words: "all [pupils] should comprehend (or at least have a chance to comprehend) the various types of territory—crown colonies, protectorates, protected states, trust territories, the Dominions, the republics within the Commonwealth." Feeling that recent changes in the Commonwealth have made it difficult for teachers of geography to "comprehend the various types of territory", let alone explain them to their pupils, I wrote to the Director of the Imperial Institute putting some questions which he has been kind enough to answer. I believe these replies will be of considerable interest to many members of the Association, and I have therefore obtained from Dr. Bradley permission for their publication in our Journal.

6, St. Peter's Place,

Drogheda, Co. Louth, Ireland.

CYRIL G. WARD.

1.—Is it correct to use the expression "*British Empire*", in view of its absence from the Queen's title? Should the word "*Commonwealth*" now replace it entirely?

As regards your first point I am informed that the term "*British Empire*" never did occur in the Royal Style and Titles. On your second point, either "*Commonwealth of Nations*" or "*Commonwealth and Empire*" is correct. Only the fully self-governing countries (which do not as yet include the Federation of Rhodesia and Nyasaland) can be described as "*Members*" of the Commonwealth. Other countries are more properly described as "*Commonwealth countries*".

It is certainly incorrect to use the expression "*British Empire*" to include the self-governing countries.

2.—Is it incorrect to continue to refer to Canada, the Commonwealth of Australia, New Zealand, Pakistan, the Union of South Africa, and Ceylon, as "*Dominions*", in view of the absence of this word from the Queen's title? Should the expression "*Commonwealth country*" be preferred?

It is incorrect to refer to Canada, Australia, New Zealand, South Africa, Ceylon or Pakistan as Dominions. They are the Queen's "Realms". Pakistan is about to become a Republic though the change has not yet taken place. The position is, of course, that Her Majesty is Queen of each of her Realms but that the Republic of India recognises her only as the symbol of free association between the countries of the Commonwealth, which is quite a different thing.

The expression "Commonwealth countries" covers both the self-governing members of the Commonwealth and the Colonies.

3.—*Since the "Crown Agents" have recently altered their title to exclude the word "Colonies", is it incorrect to use the word "Colony"? Should the expression "British Oversea Territory" now be used instead?*

It is certainly incorrect to use the term "Colonies" to cover all the dependent territories. Malaya, for instance, is not a Colony but a Federation, and some of the other colonies are Protectorates, while the Trust Territories are in a class by themselves.

The Colonial Office points out that although the use of the term "Colonies" is still preserved in the title of the Secretary of State for the Colonies, both this and the expression "the Colonial territories" are really incorrect. They agree that the best comprehensive term is "dependent territories (or dependencies) of the United Kingdom".

4.—*Is the new "Federation of Rhodesia and Nyasaland" a single country?*

The "Federation of Rhodesia and Nyasaland" must certainly be considered as one country. It is an "exclusive" Federation in that all three of the territories which compose it retain control of all subjects which have not been explicitly transferred to the Federal Government. In all matters retained by their territorial Legislatures, Northern Rhodesia and Nyasaland still have Protectorate status and their Governments are responsible to the Secretary of State for the Colonies.

THIS CHANGING WORLD

EDITED BY L. S. SUGGATE

LIVESTOCK EXPORTS FROM THE REPUBLIC OF IRELAND

Irish livestock exports in the past eight years have differed considerably in volume, composition and distribution from those of the 1930's, and the trade now appears to be developing in accordance with distinctively post-war trends. In 1953 live animals accounted for 29 per cent. of all Irish exports, as compared with nearly 54 per cent. in 1939. The following table shows the numbers of stock exported to all countries, including Northern Ireland. Figures in brackets show the United Kingdom's percentage share in the trade.

		<i>Cattle</i>	<i>Sheep</i>	<i>Pigs</i>	<i>Horses</i>
1939	783,872 (99)	388,984 (100)	63,524 (100)	10,625 (64)
1953	455,931 (96)	232,069 (100)	216 (100)	17,071 (64)

Perhaps the most striking feature of these figures is the almost complete disappearance of the trade in pigs: apart from a noticeable but temporary revival in 1950 last year's trifling export was in fact the highest since the war. Wartime shortages of imported feeding stuffs and the high costs which prevailed after the war reduced Ireland's pig population well below the 1939 level, and a recent revival of the industry based upon home-grown barley has so far made no impression on the export trade in live pigs, although production of pigmeat is greater than before the war. The decrease in sheep exports has been less spectacular, for a very pronounced decline in shipments of lambs and fat sheep to Great Britain has

been to some extent offset by an increased traffic in store sheep to Northern Ireland.

Although Ireland's cattle population is now larger than at any time in the last thirty years, recovery of the export trade has been slow and the 1942 figures have not been exceeded since the war. Only the United Kingdom trade has been involved in this decrease: shipments of cattle to continental countries amounted in 1953 to 18,378 head, mostly fat cattle for the Low Countries and France, as compared with 4,834 in 1939. Exports to places outside the U.K. were restricted to 10 per cent. of total Irish cattle exports by the Anglo-Irish trade agreements of 1948 and 1953; since the decontrolling of meat in July, 1954, this restriction has been withdrawn, but it is too early to assess the effects of decontrol. A major factor contributing to the relative stagnation of the livestock trade has been the increase in Irish slaughtering, not only for the enlarged home market, but also for export to the U.K., Europe and even the U.S.A. Exports of fresh, chilled and frozen meat in 1953 were almost twelve times as large as those of 1939. This change has been generally welcomed in Ireland as a sign of more advanced economic development because the export of store cattle for fattening elsewhere removes from the country not only opportunities for employment in the processing and by-product industries but also the animals' capacity for maintaining soil fertility in the last months of their lives. Live cattle exports, however, are still four times as valuable as total exports of beef, mutton and lamb.

Although the total export of horses is still larger than in 1939, the post-war boom in this trade seems now to be receding and in 1953 exports were the lowest since 1945. With increasing mechanisation, the number of horses in Ireland has been steadily falling and much of the new export trade has consisted of the shipment of horses for slaughter in France or Belgium. Exports to countries outside the U.K. were 19,351 in 1952 and 6,158 in 1953.

The distribution of the livestock trade among the ports of Ireland has also changed since the war.

PERCENTAGE OF TOTAL EXPORTS 1953
excluding exports to Northern Ireland
(1939 percentages in brackets)

	Cattle	Sheep	Horses
Drogheda	3.0 (2.8)	— (5.0)	4.9 —
Dublin	85.7 (65.4)	95.2 (69.9)	65.2 (69.1)
Waterford	4.0 (11.1)	2.1 (1.5)	19.5 (10.4)
Cork	6.9 (12.2)	2.7 (0.8)	9.5 (2.8)
Limerick	0.3 (0.6)	— —	0.9 —
Sligo	0.1 (0.2)	— —	— —

The ports which handled the entire traffic in 1953 exported in 1939 92 per cent. of the cattle, 82 per cent. of the horses and 77 per cent. of the sheep. Dundalk, Rosslare, Galway and Ballina dropped out of the livestock trade early in the war and have not reappeared, while Greenore, still the fifth cattle-exporting port in 1951, has had no trade since the closing of its railway at the end of that year.

Trinity College, Dublin.

J. H. ANDREWS.

THE VOLGA-DON CANAL AND ASSOCIATED DEVELOPMENTS

The opening on the 27th July, 1952, of the "Lenin" Volga-Don ship canal marked the completion of the first group of major works projected in "The Stalin Plan for the Transformation of Nature in the Drought-affected Areas of the U.S.S.R." This plan, designed especially to counteract the effects of drought in the forest-steppe, steppe, semi-desert, and desert zones of the U.S.S.R., includes irrigation schemes, the extensive planting of shelter-belts and the use of special dry-farming techniques. Associated with the new ship canal are a number of hydro-electric stations and reser-

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*Senior Lecturer in Geography, Goldsmiths' College,
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voirs, and a system of irrigations canals serving the semi-arid regions of the Rostov and Stalingrad oblasts.

Work on the canal began in 1949 but half of the work was accomplished during 1951. The canal runs from the Volga just below Stalingrad, at a height about 10 metres below sea level, to Kalach-on-Don at the upper end of the new Tsimlyansk reservoir, at a height of 30 metres above the sea. It has 13 navigation locks with their associated dams (9 on the Volga side of the watershed, 4 on the Don side), 3 pumping stations, 7 storage reservoirs and floodgates, and 8 bridges as well as ferries. A new motor highway runs alongside it. In addition, at two of the dams there are emergency barrages which would come into operation should the main dams be damaged or in need of repair.

The Volga-Don ship canal completes the system of inland waterways linking the White, Baltic, Caspian, Azov and Black seas. Regular passenger services using large river steamers have already been introduced on the routes Moscow-Rostov and Stalingrad-Kalach. The opportunities offered by the canal for cheap long-distance transport of bulk goods without trans-shipment are of great economic importance. Trains of barges and ships bearing coal and manufactured goods from the Donbass, iron ore from Krivoy Rog, wheat from the Ukraine or the Northern Caucasus, and the varied products of the Black Sea coast pass eastwards through the new canal. In return come oil from Baku, timber (often in huge rafts) from the Kama or as far afield as Karelia, and cargoes of mineral fertiliser and cement. Fishing boats on their way from the White Sea to the Black Sea need no longer sail via Gibraltar. As a result of this increased economic activity Kalach has been transformed in a short time from a quiet Cossack village into a thriving river port with grain elevators and coaling installations. Here the railway from the Donbass meets the new water-transport artery, and goods are transferred from railway-truck to barge and vice versa.

A new railway line from Morozovsk to Kuberle crosses the Don at Tsimlyansk where a reservoir and hydro-electric station were opened on the same day as the Volga-Don canal. The 13-kilometre-long dam is of earth and concrete, apart from the short section which contains the 40-metre high spillways and is of ferro-concrete. The reservoir, with a capacity of nearly 24,000,000,000 cubic metres (some 20 million acre-feet), stretches upstream for some 170 kms. from Tsimlyansk to Kalach. As a result, the lower reaches of the Don no longer suffer from the annual spring floods or from the low water of summer, and a suitable depth can now be maintained for navigation. Meanwhile the meandering course is being straightened, and the 25-year old waterway from the Sea of Azov to Rostov is being enlarged. The latter will permit the entry of large sea-going ships into a new deep-water port for which the site has already been chosen.

Since the spring of 1952 the waters of the Don have also been utilised for irrigation in the Rostov oblast. When the scheme is completed, probably in 1956, some 750,000 hectares, of which 150,000 are in the Stalingrad oblast (1 hectare = $2\frac{1}{2}$ ac. app.) will be watered by an intensive system of irrigation using a close-meshed network of distribution channels, and a further 2,000,000 hectares (1,000,000 in the Stalingrad oblast) will be watered by an extensive system with a more open network. The two systems are designed for arable and pastoral land respectively.

The main Don irrigation canal and its offshoots (the 92 km. Azov and the 73 km. Lower Don distribution canals) which were opened in the spring of 1952, provided water in the first season for the intensive irrigation of 100,000 hectares. The main canal with an initial potential flow of 35 cu. m./sec. runs southwards from the Tsimlyansk dam, tunnels through the Don-Sal watershed, crosses the river Sal, a tributary of the Don, and will eventually continue for 190 kms. to Proletarsk station in the Manyeh basin. Twenty-seven kms. from the Tsimlyansk dam the Lower Don

distribution canal with an initial potential flow of 28.63 cu. m./sec. leaves the main canal and leads water to the 65,000 hectares of land already intensively irrigated in the valley of the Lower Don. The river Sal, above its intersection with the main canal, now acts as a distribution canal and the water of the Don flows eastwards along it. In their first season the newly irrigated lands produced crops of wheat, cotton and rice. The average yield of wheat was 10,800 lb. per hectare.

It is also intended to use the waters of the Volga-Don ship canal for irrigation purposes. The Ergeni distribution canal will run southwards for 140 kms. along the Ergeni uplands (the Volga-Don divide), supplying water to the land lying to the west between the divide and the Tsimlyansk reservoir.

(Based on Russian sources, including *Pravda*, the weekly magazine *Ogonyok*, and the 1952 *Bulletin of the Academy of Sciences of the U.S.S.R.—Geographical Series*. A useful account in English of the scheme of work of which the Volga-Don canal is a part can be found in A. A. Grigoryev, "Soviet Plans for Irrigation and Power," *Geogr. Journ.*, vol. cxviii, 1952, pp. 168-179, which can be consulted in the Association's library).
University of Manchester.

J. COLIN CROSSLEY.

THE TERRITORIAL STRUCTURE OF YUGOSLAVIA

The Federal People's Republic of Yugoslavia, established on 31st January, 1946, represents the third major attempt of the Yugoslav people to find a satisfactory way of achieving national unity in 28 years of political independence. Since its first constitution was adopted, the young state has passed through three phases of administrative organisation.

In December 1918, the *Kingdom of the Serbs, Croats and Slovenes* came into being and the Vidovdan Constitution of January 1921 gave form to the centralised, unitary, constitutional monarchy under the House of Karageorgevic. The "historic provinces" were united in the new kingdom but no local autonomy was allowed to them. Internal dissension prevented the achievement of national unity under this first constitution and, in an effort to break down regional differences associated with the "historic provinces," a new territorial structure was set up in October 1929. The state was re-named the *Kingdom of Yugoslavia* and the country divided into nine administrative districts (*banovine*) which bore no resemblance to the previous divisions. In the same year King Alexander proclaimed a royal dictatorship which was modified by the Alexandrine Constitution of September 1931. The administrative system based on the nine *banovine* (Drava, Drina, Dunav (Danube), Morava, Primorje, Sava, Vardar, Vrbas and Zeta) and the prefecture of Belgrade, retained its highly centralised and unitary political character. One important result of this re-organisation for geographers and others was that, as the first full Yugoslav census was taken in 1931, all statistical data for the decade preceding the second world war were collected and tabulated on a *banovina* basis.

For several years from April 1941, the various parts of Yugoslavia were occupied or annexed by Germany, Italy, Bulgaria and Hungary. The material destruction, human suffering and political chaos associated with this dismemberment led to a nation-wide support of the Partisan Movement which ultimately acquired solidarity under Communist leadership. With the liberation of the country, the post-war government promulgated a completely new constitution, that of the *Federal People's Republic of Yugoslavia* (see *Yugoslavia*, edited by R. J. Kerner, C.U.P., 1949). The *banovine* were swept away, the "historic provinces" were rehabilitated but, in striking contrast with their earlier status, they became People's Republics. According to the Constitution of 31st January, 1946, these People's Republics have considerable autonomy



The Territorial Structure of Yugoslavia. Of the six Republics, those of Slovenia and Macedonia are the only ones which approximate to physical regions. Kosmet is an abbreviation of Kosovo-Metohija. Titograd, the capital of the People's Republic of Montenegro was formerly Podgorica.

within the federal framework. The accompanying map shows the post-war territorial structure of Yugoslavia with its six People's Republics and the two Autonomous Provinces which are closely associated with the People's Republic of Serbia. The Republics are very unequal in size and population as the following table, taken from the census of March 1953, shows.

Republic	Population	Density per sq. km.	Increase 1948-53	Area sq. km.	Percentage of total area
SERBIA	6,983,544	78.8	455,578	88,563	34.5
Serbia Proper	4,460,405	80.0	323,471	55,724	21.4
Voivodina	1,713,905	76.2	50,693	22,488	9.0
Kosmet	809,234	78.1	81,414	10,351	4.1
CROATIA	3,913,753	69.9	156,946	55,937	21.8
SLOVENIA	1,462,961	72.4	71,088	20,192	7.9
BOSNIA & HERCEGOVINA ..	2,843,486	55.1	278,209	51,564	20.1
MACEDONIA	1,303,906	49.2	150,920	26,494	10.3
MONTENEGRO (CRNA GORA)	419,625	30.3	42,436	13,839	5.4
YUGOSLAVIA	16,927,275	65.9	1,155,177	256,589	100.0

With more than one-third of the total area and total population, Serbia is in a position to dominate a unitary Yugoslavia. The Serbs have the longest tradition of political independence among the South Slavs and, what is more important, they control the richest food producing area of the whole country, Voivodina. In view of these and other separatist factors, it is probable that a federal structure is the only satisfactory *modus operandi* in the administration of Yugoslavia. At first the Federal Republic was run on authoritarian lines, with the assistance of a powerful secret police force, but the rupture of relations with the other Cominform countries in 1948 initiated a phase of slowly increasing decentralisation. Great economic difficulties were encountered as a result of three disastrous

droughts between 1945 and 1951 and the early plans for industrialisation and the mechanisation of agriculture were upset by the failure of the Soviet Union and some of its satellites to deliver promised machinery and other goods. The Federal Constitution must be seen as functioning against a background of physical and human diversity, of conflicts arising from the differing historical evolution of the constituent Republics and expressed in religious and linguistic heterogeneity, of grave economic difficulties in a land of predominantly agrarian character in which over-population is a decisive element and, finally, of pressure, political and economic, from external sources.

At present, all the major aspects of national affairs remain in the hands of the central government in Belgrade but devolution is in progress. The Yugoslav Ambassador to the Court of St. James said of his country recently: "As the state machinery with its centralistic and authoritarian tendencies weakens, the focus of attention is shifted from the centre to local government, the nucleus communes of the future." (Quoted in *International Affairs*, vol. xxx, April, 1954.) Whether the deep-rooted internal antagonisms which disrupted political progress in pre-war Yugoslavia will be sublimated under the post-war régime remains to be seen.

Birkbeck College, London.

A. E. MOODIE.

UNIVERSITY PROBLEMS IN MALAYA

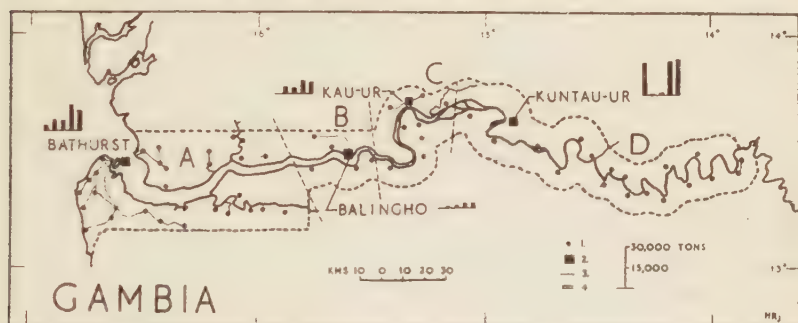
The transformation of Malaya into a modern community has reached a stage at which the provision of higher education on a large scale has become a necessity. A commission was sent out from Britain to advise on various problems and the University of Malaya came into existence, temporarily at least in Singapore itself, in 1949, as a development of Raffles College and the College of Medicine. The special problems of a university under the circumstances of an equatorial climate and with a very mixed population offer material for thought and experiment. The new building specially designed to house the library is in glass-brick to promote air-conditioning within. Air-conditioning makes it practicable for students to work in the building during the heat of the afternoon, but, important as this is, a still greater reason is the preservation of the books. Mildew, insects and many other enemies of paper have to be conquered in the Singapore climate, and, even with untiring vigilance, some enemies get at the books and may destroy them. We know that a famous Chaucer manuscript in a British library was nibbled long ago by rats, but our difficulties, even from smog, are small in comparison with those Singapore university has to face. Bulk of books, always increasing, adds to the problem. The new university is meeting this to a large extent by microphotography of important books so that renewable copies may be kept in as small a space as possible for efficiency of supervision. This involves the provision of screens on to which the image of the microphoto can be projected for the reader's use.

It has been proposed to move the university to more rural surroundings in the adjacent part of Johore. It has also been suggested that, in view of the differences of language, interest, and needs between Malays and Chinese, there should be a Chinese university as well as one for the Malay people. The arguments for this are very strong in view of the large numbers of recent Chinese immigrants who know neither Malay nor English. Yet there is the danger that, with the well-known political activity of students, at least outside Britain, the two universities would mean that it would become easier to stir up hostility between Malays and Chinese. Also a special Chinese university, in Singapore, and a Malayan university, in Johore, would mean that many Malays in Singapore, with its million population, unable to go to Johore, would find themselves in a position of inferiority in what is after all their homeland.

H. J. FLEURE.

THE GAMBIA OILSEEDS MARKETING BOARD

An urgent difficulty which a monocultural peasant economy like that of the Gambia has to face is that presented by fluctuating world prices. For the farmer is all too likely to panic at any sign of a fall in his selling price. This may well cause a sharp fall in output in subsequent years until confidence has been restored. The unhappy effects of such events will be most pronounced in a small country like the Gambia with its present dependence upon one crop—groundnuts—and so in 1949 the Gambia Oilseeds Marketing Board, with a statutory monopoly of the export of groundnuts from the Gambia, was set up as part of an attempt to stabilise prices to the farmer. This was to be done by slightly underpaying producers during the years of high world prices, so accumulating a reserve from which the same producers could receive a price higher than that generally obtaining on world markets during years of low prices. The need for this is underlined when we remember that in the inter-war years, 1923-1939, the maximum average seasonal price received by producers was £12 per ton, the minimum



The groundnut trade of the Gambia, 1950-51. 1. U.A.C. buying point. 2. Shipping port. 3. Chief lorry routes. 4. Barrakunda Falls. A. Region despatching its groundnuts to Bathurst. B. To Balingho. C. To Kau-ur. D. To Kuntau-ur. The graphs against each of the shipping ports give: 1st column, tonnage received in power craft and lighters; 2nd column, tonnage received in sailing craft; 3rd column, tonnage received by lorry; 4th column, total tonnage received; 5th column, tonnage exported from that port. Note that some redistribution of the crop after its initial gathering at the shipping ports takes place in Kuntau-ur's favour, though especially in Bathurst some of the crop will be consumed locally. Kuntau-ur, on this showing, is the leading shipping port for groundnuts; the Upper River, above MacCarthy Island, is the largest producing area.

£3 4s. 0d. Clearly, if the Board can succeed in its purpose it will perform a most valuable service. One hesitates at this early stage to pronounce judgment: it is possible that recessions such as the present one (*Geography* January 1954, p. 46) may not occur in the future when confidence in the Board has been established.

The Marketing Board works through authorised buying agents of which the United Africa Co., Ltd., is one of the more important. The Board issues a list of buying points which will vary slightly from year to year, though the accompanying map indicates most of them, and at these points licensed dealers purchase all nuts offered for export on behalf of the buying agents, the minimum buying price being fixed by the Board. The nuts are stored after purchase in large heaps which form conspicuous features of the cultural landscape and which are known as *seccos* (Fr. *sec*, dry—a store in a flat, dry place). From the buying points the crop is moved to one or other of the four exporting ports of Bathurst, Balingho, Kau-ur and Kuntau-ur as indicated on the map. Some of the crop thus moved is consumed locally, and there is often some slight further crop movement before final export.

It is fortunate that the Gambia River permits the navigating of small ocean-going vessels as far upstream as Kuntau-ur, 150 miles from its

mouth, where the river is $\frac{1}{2}$ mile broad and ships of 19 feet draught can moor directly against the bank (the bar across the mouth of the Gambia is always covered with at least 26 feet of water). This is particularly useful as loading is entirely manual; inclined planks are laid from the river banks up to the decks so that the labourers can walk right up on to the decks with their headloads and tip the nuts straight into the hold. Each labourer carrying a full bag is handed a fixed sum as payment as he passes out of the secco gate *en route* to the loading plank.

It is interesting to notice that most of the ships in the export trade are Scandinavian ones which are engaged in the Baltic timber trade during the summer and which turn to other activities during the winter freeze. This fits in well with the "trading season" (December–February) of the Gambia, the more so since comparatively low freight tariffs are charged for this off-season work. It is a point worthy of comment that Gambian groundnuts are exported in shell, despite disadvantages such as loss of freight space and loss of valuable potential fertiliser (the shell is very rich in potash, and it can be made into an excellent cattle cake). It may be that a territory which has not been able to supply enough labour even to grow its own groundnuts (hence the "strange farmer": Jarrett, *Geographical Review*, October 1949) has not in the past been able to supply labour for hand decortication, though this cannot apply today. Machine decortication employing very little labour was carried on at Kuntau-ur during the war when shipping space was especially valuable, but this has now stopped, despite the fact that in surrounding French territories it is an established practice. It may simply be that the pull of tradition is stronger than the pull of economic advantage—a phenomenon not unknown in other parts of the world. (Information from the U.A.C. publication, *Statistical and Economic Review*, No. 11, 1953.)

Fourah Bay College, Freetown.

H. R. JARRETT.

SOME RECENT GOLD MINING DEVELOPMENTS IN THE UNION OF SOUTH AFRICA

In 1953 South Africa produced 11,940,616 fine ounces of gold (45% of the world's known gold production) yielding a working profit of £38.6 million of which the Government's share was £12.3 million. Though the production was less than the 14 million ounces of the record year of 1941, it is believed that by 1970 the total Union gold production will have risen to nearly 20 million ounces. Competent authorities predict that the 1953 value of gold output (£147.6 million) will be increased by £100 million in the next nine years. These optimistic forecasts are based on two major developments now taking place, viz., the development of new gold mining areas and the production of uranium.

Of the Union's forty-nine major gold mines in 1953, twenty-one have been established since 1945 in the Far West Rand (3), Klerksdorp (5) and Orange Free State (13) areas.¹ By the end of 1953, ten of the twenty-one mines were already producing and the rest should do so by 1958. These three mining areas produced a total of 2 million ounces of gold in 1953, possibly only one-seventh of their eventual annual production. Since 1945, more than £200 million have been spent on capital works in developing them and their average yield of gold per ton of ore crushed will be higher than in the older mines of the Witwatersrand. Production of the latter mines is expected to decline slowly despite their extension to depths of over 8,500 feet.

Uranium-bearing minerals occur in economic quantities in many auriferous horizons and production of uranium oxide as an adjunct to gold mining was commenced in 1952. Twenty-three mines have so far (June 1954) been approved by the Atomic Energy Board of South Africa as

¹ See pp. 13–20 of this volume of *Geography* for an account of the O.F.S. Goldfield by P. Scott.



uranium producers, and the scheme is estimated to yield eventually a gross revenue of over £30 million per year, which will not only supplement the income from gold but will also prolong the life of those low-grade gold producers which possess rich uranium deposits. Among the major problems facing the gold mining industry are shortages of capital and labour. The cost of bringing a mine to production has increased from about £3 million in 1939 to £10-£12 million in 1954. Only a temporary advantage was given by devaluation of the pound in 1949 since costs continued to rise while the price of gold has remained stationary at 35 dollars or 247s. 2d. per fine ounce. Since 1939 employment of native labour by the gold mines has declined by about 10% whereas in other industries it has increased by 20%. Shortage of labour has reduced the gold mining industry to about 85% of its capacity, though with increased efficiency it is operating with about 50,000 natives fewer than in 1946. The new developing mines, the production of uranium and the rapid industrial expansion in the Union have greatly strained its labour resources. In 1953, 47,983 Europeans and 310,946 natives were employed by gold mines.

Population shifts and the development of new urban centres have been a significant feature of post-war gold mining. In 1953 there were 35,000 Europeans and 80,000 natives on the O.F.S. goldfield, and 18,000 and 40,000 respectively round Klerksdorp. These numbers will probably be

doubled in the next ten years. Despite these impressive developments, the search for gold continues and the Eastern Transvaal is now being prospected by virtually all the major mining groups. So far, however, apart from the report of a payable reef in the Bethal district, no details have been disclosed.

While the earlier development of the Union's economic structure was determined by the overwhelming importance of gold mining, its contribution in recent years has been overshadowed by that of secondary industry. Thus, in 1952-3 gold mining contributed 9.1% and secondary industry 27.8% towards South Africa's net national income of £1,247 million. However, since gold accounts for 40% of the value of South African exports, the foreign exchange earned in this way, together with the market provided by the gold mining industry itself, has played a great part in stimulating the development of manufacturing industry. The gold mining and uranium developments which have been briefly described here will, however, ensure the maintenance of the industry's high place in the national economy.

Natural Resources Development Council, Pretoria.

T. J. D. FAIR.

NORTH-WESTERN QUEBEC

The counties of Abitibi East, Abitibi West, Rouyn-Noranda, and Temiscamingue, totalling over 85,000 sq. miles in area, form the north-west corner of the populated part of the province of Quebec. This section of the country is now developing into a major mining district; the population, only 6,685 in 1901, rose to 141,458 in 1951. Physiographically the whole area belongs to the Canadian Shield, and includes not only granite blocks, but also the so-called Clay Belt in which clays and sandy loams were deposited in peri-glacial lakes which have dried, leaving a gently rolling surface.

Interest in north-western Quebec first arose when good clay soils were discovered in the Canadian Shield. The branch of the Ontario Northland Railway from the Kirkland Lake area to Noranda was meant to open the arable Clay Belt, but mineral discoveries at Cobalt, Ontario, and later at Noranda caused a mining boom in 1904 which stimulated further development. Settlement did not expand to any great extent until the Canadian National Railway Company opened the northern route from Quebec to Winnipeg as far as Amos in 1915 and so connected north-western Quebec with the Canadian market. People were attracted mainly from other parts of the Province of Quebec, with the result that 86 per cent. of the population is of French origin.

Since the opening of the first mine at the turn of the century, over 23,000 claims have been staked. At present, 30 out of 35 operating mines in Quebec are in the northwestern part of the province. Twenty-one of them are mining gold, and nine base metals—copper, silver, zinc, lead, selenium, molybdenum, bismuth, plus pyrite as a by-product. There is a growing emphasis on base metals. Within the last 25 years 120 million tons of ore have been treated. In 1953 the 9 million tons of ore treated had a value of over 100 million dollars.

Recently gold and base metals have been discovered in the Bachelor Lake area, 90 miles north-east of Senneterre, and a large body of copper has been found in the Chibougamau area, 120 miles north-west of Lac St. Jean. A winter road has been cut from Senneterre to Bachelor Lake; a 150-mile highway from St. Felicien near Lac St. Jean to Chibougamau was completed in 1952 while a railroad is under construction. At present the base metal concentrates are trucked to the railhead in St. Felicien. In October 1952, the Barrue mines in Barracute township commenced hauling zinc which is sent to the United States for reduction in an electrolytic zinc reduction plant in the St. Lawrence Valley would be of great value to Quebec; Concentrates from the copper smelter at the Noranda mines are

sent to Montreal and electrolytically refined—copper, gold, silver, and selenium being separated.

In the Quebec Clay Belt there are about 1,200,000 acres of farm land. The climate is suitable for hay, root crops and pasture. The average maximum and minimum temperatures in July are respectively 74° F. and 54° F. at Abitibi, and 78° F. and 54° F. at Ville Marie. The comparative figures for Montreal are 78° F. and 61° F., and for Quebec 76° F. and 57° F. The main drawback is that frosts may occur even in midsummer. How-



ever, a ready market is found in the nearby mining towns, and farming is on the march. Over 80,000 acres were cleared between 1949 and 1953. Grain and hay are grown on three-quarters of the acreage and the value of livestock has increased almost six times in the last decade. Carefully selected settlers may choose their own land. One hundred acre lots can be purchased for 30 cents per acre and government financial assistance is available. The agricultural schools in Ville Marie and La Ferme help to educate the rural youth.

Only a very small part of the vast forests of north-western Quebec has been surveyed. Eighty per cent. consists of spruce, jack pine and balsam, the rest being birch and aspen. The mining industry alone uses 24.4

million board feet of construction and fuel wood. Twelve thousand square miles of well-forested land will become accessible when the railway, which will serve the most productive area, from Beattyville to St. Felicien via Bachelor Lake and Chibougamau, is completed. In 1953 development of water power was 182,000 h.p. with a further 16,000 h.p. being harnessed. The total potential, at 6 months' flow, is estimated to be over 4 million h.p.

Eight major distribution centres serve north-western Quebec's farming and mining district: La Sarre, Ville Marie, Val d'Or, Bourlamaque, Rouyn, Noranda and Amos. La Sarre, founded as an agricultural community in 1917, has about 3,000 inhabitants. Six wholesalers and 73 stores with 400 employees serve some 38,000 people. The largest centre is formed by Rouyn-Noranda (24,417 inhabitants), two individual cities which have grown up side by side—Noranda as a mining centre and Rouyn as the "undisputed commercial metropolis of north-western Quebec," with together 14 wholesalers and 241 retail stores.

*Department of Mines and
Technical Surveys, Ottawa.*

ANNEMARIE KROGER.

THE GEOGRAPHICAL ASSOCIATION

ANNUAL CONFERENCE

The Annual Conference will be held in the London School of Economics from 4th to 7th January, 1955. The programme has already been despatched to members; requests and payments for tickets for the Annual Dinner, excursions, etc., should be sent as early as possible to the address given in the programme. Extra copies of the programme may be obtained from the Assistant Secretary at headquarters; a stamped addressed envelope must be sent with applications for these.

NOMINATION OF NEW MEMBERS OF COUNCIL

Four new members of Council to replace the retiring members are due to be elected at the Annual General Meeting to be held on Wednesday, 5th January, 1955. Nominations should be sent to the Honorary Secretary at headquarters, signed by four members of the Association, as soon as possible. The persons so nominated must have expressed their willingness to serve on Council for three years.

NEW CHAIR OF GEOGRAPHY

The Association welcomes the creation of a new chair of Geography in the University of Hull and offers its cordial congratulations to Mr. H. King who has long been Head of the Department on his election to it.

SUMMER SCHOOL FOR ALPINE FIELD STUDIES—SISTRANS, AUGUST, 1954

The Association places on record its thanks to Mr. R. C. Honeybone (Institute of Education) and Dr. K. A. Sinnhuber (University College) of the University of London, for their organisation and conduct of a very successful Summer School at Sistrans, near Innsbruck, Austria. The following report is submitted by Mr. Honeybone.

The school was held from 12th to 25th August, inclusive, in Sistrans, a tiny village situated to the southeast of Innsbruck, on a broad terrace overlooking the Inn valley. Including the two leaders the school comprised a total of fifty-nine people. Mrs. Honeybone acted as hostess.

The main object was to study in detail the terrace or Mittelgebirge, so that its significance in the physical evolution and present economic development of the main Inn valley should be made clear. A number of longer excursions were also made both on foot and by coach in order to set the Sistrans area in its larger regional setting.

The first day was devoted to an ascent of Patscherkofel (2,248 m.) by cable railway and a descent on foot through the forest. The view of the Inn valley and the tributary Stubaital, and of the limestone Alps to the north, contrasting vividly with the crystalline Alps to the south, was magnificent and enabled all members of the party to see at a glance the broad features of the landscape in which they were to work for the next ten days. Unfortunately, the Föhn wind,

gusting up to 70 m.p.h., rendered sketching and discussion from the top of the mountain quite impossible, and most members heaved a sigh of relief when they descended to the shelter of the forest below.

The rest of the work fell broadly into two parts, one based on individual and group work and the other undertaken as a party. The weather, which was in general good, was rather unkind to the group work. On two days devoted to a transect from south to north across the Inn valley, land-form mapping and land-use and soil surveys, it rained, the transect work in particular being handicapped by very heavy rain. On another day given over to village studies, the weather was good and the results were most valuable.

There were also excursions by coach to the famous Gschnitz terminal moraine, to a salt mine in the limestone Alps, and to northern Italy; the last involved crossing the Jaufen Pass, perhaps the most spectacular in Europe. The party also visited the remains of medieval settlements at Vill and Birgitz and spent one day in the Stubaital, some members returning by way of the stupendous Sill gorge and others going over the top of the crystalline mountains *via* St. Maria Waldrast.

The programme was thus both strenuous and varied, and it was made additionally pleasant by the hospitality of the *Gasthof zur Krone*, which was the headquarters of the school.

GIFTS TO THE ASSOCIATION

We are grateful to Life Members for their generous response to the appeal for donations specifically made to them earlier this year. Between February and September this year, donations totalling £110 11s. 6d. have been received and acknowledgment is made to the following Life Members:—

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EARLY GEOGRAPHY TEXTBOOKS

Since November, 1953, when an appeal was made in *Geography* for early textbooks of our subject, many members have sent copies of textbooks varying in date from 1751 to 1934. The books now available will form the nucleus of a representative collection which it is intended to maintain as a special exhibit in the library. The number of books involved is too large for the titles to be listed in these pages, but a typed catalogue will be supplied on application to the Assistant Secretary.

We are especially indebted for many of these books to the bequest of the late James Fairgrieve, and also to the Headmistress of St. Columba's School, Kilmacolin, Renfrewshire, for a large number of early books. Other donors are:—

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BRANCH NEWS

Bedford and Luton. Enquiries have been received about branch activities in these districts, where at present no working branches exist. Members in the locality who would be interested in forming a Bedford branch or in reviving the Luton branch are asked to write to headquarters.

Berkhamsted. A new branch centred here has been formed and the winter programme has already started. Any member in the locality who has not been informed of the branch's activities should apply to the Secretary, Mr. G. F. B. Park, 1, Egerton Road, Berkhamsted, for the programme.

Bournemouth. Efforts to form a new branch are being made in the Bournemouth-Ringsted area, and meetings have already been organised. Members interested in taking part in this branch's activities should write to Mr. D. A. E. Cross, 35, The Quomp, Ringsted, Hants.

SPRING CONFERENCE, 1955

The next Spring Conference will be held from 12th to 16th April, 1955, at York, where accommodation will be available at St. John's College, by kind invitation of the Principal, the Reverend L. Lamb. The programme and application forms will be included with the January issue of *Geography*. All enquiries and applications for the reservation of accommodation should be made in due course to the Honorary Conference Organiser, Mr. R. O. Smith, M.A., at St. John's College, York.

SUMMER FIELD MEETINGS, 1955

Preliminary arrangements are being made for the organisation of field meetings abroad during August 1955. Members who would be interested to have further information as it becomes available are advised to write to the Assistant Secretary at headquarters now. It is hoped that it may be possible to organise meetings in the lower Rhône basin and Switzerland, but until we have some indication as to the numbers of possible participants, we cannot give fuller details. It is greatly regretted that the meeting proposed to be held in Brittany has now had to be cancelled owing to insurmountable difficulties connected with its organisation.

XVIIIth INTERNATIONAL GEOGRAPHICAL CONGRESS

The following announcement has been received from Professor Sternberg:—
 "The XVIIIth International Geographical Congress has been scheduled tentatively for 9th to 18th August, 1956. To ensure the widest distribution of the preliminary circular, the Organizing Committee requests that all geographers not included in the World Directory of Geographers published in 1952 by the International Geographical Union should send their names and addresses to Professor H. O'Reilly Sternberg, Secretario Ejecutivo, XVIII Congreso Internacional de Geografia, Av. Presidente Antonio Carlos 40, 9° andar, Rio de Janeiro, Brasil." Professor Sternberg should also be notified of any changes which have occurred in the addresses listed in the Directory.

CIVIL SERVICE OPEN COMPETITIONS

Open Competitions are announced to be held on March 1st and 2nd, 1955, for candidates between 16 and 26 years for posts of Cartographical Draughtsman or Surveyor, Ordnance Survey, and Cartographer, Directorate of Colonial Surveyors; closing date for applications, December 30th, 1954. Particulars are available from Civil Service Commission, Burlington Gardens, W.1, reference No. 208-226/55

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"The striking sketch maps, statistics, comprehensive historical summary, clear printing, useful index and numerous illustrations make these books most acceptable."—*The Independent School*

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REVIEWS OF BOOKS

WITH very rare exceptions, books reviewed in this journal may be borrowed from the Library by full members or student library members of the Association.

Geographical Excursions in and around London. G. B. G. Bull (ed.). 12 × 18 cm. 52 pp. London. University of London Institute of Education. 1954. 2/6.

Any method of extending the practice of field studies is welcome, and this pamphlet, which will greatly assist London teachers to find suitable excursions, should have that result. Furthermore, by example, it should enable teachers to develop other excursions for themselves. Since *exact* details of the routes are not given, teachers would be wise to reconnoitre the ground before leading a party. On the Epping Forest excursion (p. 23) Loughton Camp is incorrectly described as "of Roman origin." It is an Iron Age fortification (see the *Essex Naturalist*, vol. 22, p. 117, 1929).

The pamphlet obviously owes much to the inspiration and teaching of Professor S. W. Wooldridge; indeed some of the excursions were originally his.
E.M.Y.

Report on Southern Africa. Basil Davidson. 13.5 × 20.5 cm. 285 pp. London: Jonathan Cape Ltd. 1953. 16/-.

Mr. Davidson's survey is but one of a series of popular diatribes against the white peoples of the Union of South Africa and the Rhodesias. It cannot pretend to be impartial; bias is inevitable because the author is deeply involved in the English political scene. It is written in a melodramatic, journalistic style. When official documents support his viewpoint, Mr. Davidson uses them extensively. He is, like his friend Abraham (page 83) "a well-informed if prejudiced guide," and has little to say about official efforts to persuade the Bantu to change their traditional agricultural and social customs. This book has no place in a school library, where immature and uncritical minds might read it as ultimate truth.

D.L.N.

The United States of America. H. Plaskett. 14 × 21.5 cm. viii + 200 pp. London: University Tutorial Press Ltd. 1953. 8/6.

This book was written to provide "background information for the improvement of Anglo-American co-operation." The author sketches, in popular vein, an explanatory picture of the contemporary scene in the United States. He describes the characteristics and origins of the American people, outlines their government and constitution and discusses some aspects of the diverse environments in which they live. The educational system, religion, American papers, books, culture and entertainment are all reviewed. There is a summary of the characteristics of agriculture, industry, trade, communications, finance, and of the problems and relations of "capital and labour." The account ends with a brief examination of "Outlying Areas and Defence" and "Relation with the Outside World."

For those who have little knowledge of the United States this may prove an informative volume. However, the presentation is unbalanced. The discussion of the physical environment is quite inadequate and this surely is "background information" of fundamental importance. If space is limited much may be described by maps but this work contains only three very poor examples and none has a scale. There is no bibliography to encourage further reading.
R.A.G.S.

Race and Class in Rural Brazil. Edited by C. Wagley. 13.5 × 21.25 cm. 160 pp. London: U.N.E.S.C.O. 1953. n.p.

It is fortunate that, while so much attention is focussed on the world's many racial problems, Unesco has published the results of four research projects in a nation unique in its rich heritage of racial democracy. The relative importance attached to race, wealth, occupation and education in four dissimilar rural areas is objectively analysed and a final chapter assesses present trends in Brazil's multi-racial society. The book is a valuable contribution to the social

geography of the Amazon valley and the plantation coast, mountain core and arid *sertao* of Bahia, and provides material which students and teachers often seek in vain. G.J.B.

Chile : an outline of its geography, economics and politics. G. J. Butland. 13.5 × 21 cm. vii + 128 pp. London : Royal Institute of International Affairs. 1953. 12/6. **Colombia : a general survey.** W. O. Galbraith. 13.5 × 21 cm. vii + 140 pp. London : Royal Institute of International Affairs. 1953. 13/6.

Both these books maintain the high standard which we have come to expect from this series of political background studies. Even geographers sometimes need a corrective to one-sided thinking and books of this kind based on first-hand experience and authoritative sources of up-to-date information are in many respects able to supply it. As a geographer, Dr. Butland has very properly paid more attention to physical conditions and their significance in all phases of life than most other writers in the series. His concise but informative survey of social and economic conditions which takes up nearly half the volume on Chile is a valuable source of information on a little known country. It makes one wish that more geographers could for a time hold public office and more administrators have a geographical training. W. O. Galbraith's contribution is more historical in outlook but no less competent. He draws attention to notable cultural achievements of Colombians but makes no grandiose claims regarding the great potential economic wealth of the country. Readers will find in his book a careful and balanced appraisal of resources and of the difficulties which must be overcome before these can be converted into available goods. A.J.H.

The Australia Book. Eve Pownall, illustrated by Margaret Senior. 25 × 34.5 cm. 46 pp. London : Methuen. 1953. 10/6.

When this slim volume was produced in Sydney, the Children's Book Council rated it the best publication of the year and it will undoubtedly appeal to English children too. Briefly and in simple language the book describes to young Australians the history of their land. Colourful drawings adorn each of the large pages to portray in a delightful manner the succession of explorers, convicts, squatters and diggers who played their parts in the development of this sunburnt country. This entertaining chronicle of British colonisation is likely to prove a popular addition to the shelves of the secondary school library or junior geography department, although it is too large in size for the average satchel. Nearly all the places mentioned in the text (which is virtually a sequence of captions serving the illustrations), are located on an endpaper map. One or two phrases might have been more happily worded ; for example, on p. 31, we learn that the overlanders in Queensland "pushed further and further on until they spread right across the top of the map," but these demurrings of the purist are not likely to mar the enjoyment of the general reader. In view of the price and the attractiveness of its contents, this book is worthy of a more elegant binding and cover-design. L.J.J.

Rice. D. H. Grist. 14 × 22 cm. xiv + 331 pp. London : Longmans Green & Co., Ltd. 1953. 35/-.

This is the first volume to be published in a promised series on tropical agriculture under the general editorship of Sir Harold Temperley, who is to contribute the general introductory volume himself. If later volumes maintain the standard set by the first it is clear that the gap which has long existed on the geography shelves of every school library will be most effectively filled. There are three plates in colour and an excellent series of 68 well-chosen photographs, as well as a number of useful text figures. Unfortunately the solitary distribution map is both useless and incorrect and the caption is incorrect. As a whole the text does not make easy reading and one is left with the impression that though the author may have studied the three hundred items listed in his bibliography, he has not digested the contents sufficiently to give a balanced picture. As a result, much of the text is a scrappy résumé of sources which are listed in the bibliography at the end—without the titles of the papers so that one cannot tell what any particular paper may cover. Climate is ignored in the index and almost entirely so in the text ; nearly all the rice of Italy and the Balkans is grown outside the latitude of 40° N. which the author gives as the limit of cultivation.

Instead of a classification of rice types of general application, one gets brief notes on rival schemes and an extended summary of a scheme applicable to Burma only. Despite these defects the encyclopaedic range of information must substantiate the claim of the book to its place on the reference shelf. L.D.S.

A World Survey from the Human Aspect. J. F. Unstead (A Systematic Regional Geography, vol. III). Third Edition. 14 × 21 cm. xii + 452 pp. London: University of London Press, Ltd. 1953. 18/-.

This well-known book needs no introduction. The first edition was reviewed at length in vol. xxxiv of this journal. The present edition has been revised to take account of recent political changes and appropriate additions have been made to several chapters to bring them up to date. The previous reviewer's strong recommendation still holds good. A.J.H.

The Ocean River: the story of the Gulf Stream. H. Chapin and F. G. Walton Smith. 14 × 22.25 cm. viii + 325 pp. London: V. Gollanz, Ltd. 1953. 16/-.

The "Ocean River" is the North Atlantic and in particular the currents and drifts in it, but this serves merely as a string on which the authors thread a series of beads, chapters dealing with the earliest records, with exploration, oceanography, meteorology, geophysics, economics and indeed sociology. The treatment is of necessity therefore general and popular. For anyone wishing for such an introduction to these subjects the book is most readable and indeed entertaining, but serious students will find it a compilation and specialists will regard it as elementary. R.M.

A Voyage Round the World with Captain James Cook in H.M.S. Resolution. A. Sparman. 14 × 22 cm. xx + 214 pp. London: Robert Hale Ltd. 1953. 21/-.

In his long southern voyage in the "Resolution," Cook took with him a Swedish botanist who later published an account of the journey in Swedish. It does not materially differ from Cook's account except in more scientific detail and accounts of the natives they met. The translation is good and the book forms a happy appendix to Cook's own "Voyage." There is a large folding sketch map. A bibliography adds to the value of this book which should be in every school library. R.N.R.B.

Beyond Horizons—sea adventures in the age of discovery. Carleton Mitchell. 14 × 22 cm. 254 pp. London: William Kimber & Co., Ltd. 1953. 15/-.

The author has chosen heroic episodes from the sea adventures of the age of discovery, sometimes retelling them and sometimes repeating the words of a contemporary writer. He has chosen his stories from a period when ships were small, new lands and seas still to be found and certain dangers to be faced. Among these well chosen tales, are Bligh's remarkable boat journey from the "Bounty" to Timor, Young's journey to Hudson Bay, Wallis's discovery of Tahiti, Anson's voyage in the "Centurion," "Robinson Crusoe" and several others. There are a few sketch maps and a bibliography. A lively and entertaining book. R.N.R.B.

See What I Mean: design and production of individual visual aids. M. Ray. 14.5 × 23 cm. 56 pp. London: Cassell & Co. Ltd. 1953. 7/6.

This is a useful little book for teachers who are interested in making their own visual aids. It contains helpful advice on the construction and layout of wall charts, the mounting and preservation of pictures, the use of symbols and their relative visual effectiveness, and the making of film strips. It is a general purpose book, not confined to the particular interests of geographers, but interesting nevertheless in advising them in the best methods of presenting their visual material. Perhaps the most helpful section to the geographer is the advice on making lantern slides by drawing maps or diagrams on glass or cellophane with Indian ink. Some teachers have used this method for many years but it is a very simple device worthy of wider use. R.C.H.



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